

# AUTOMOTIVE INDUSTRIES

## The AUTOMOBILE

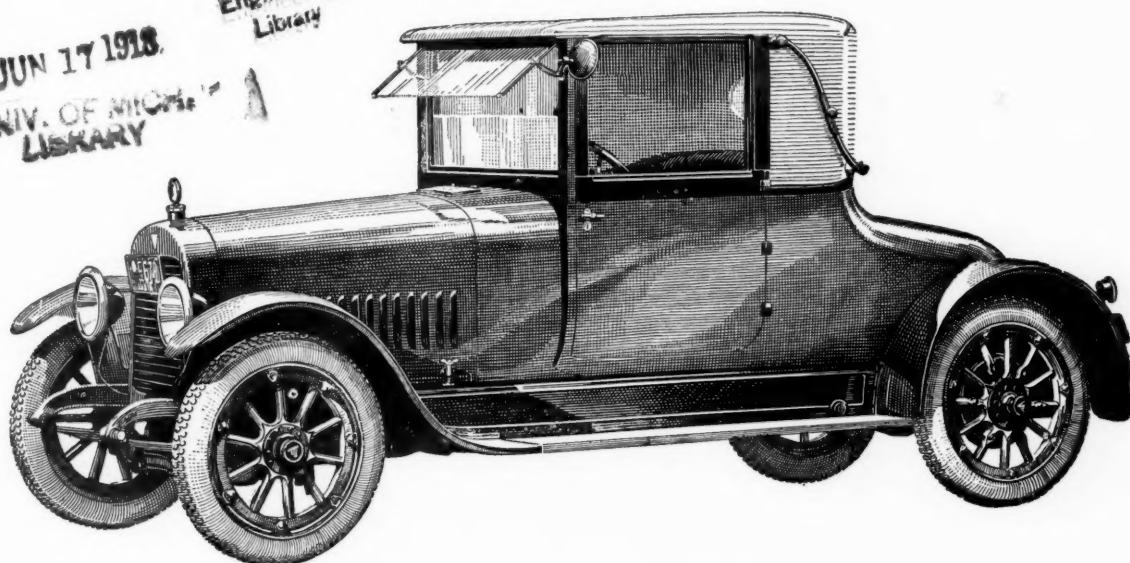
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## A New Type Super-Six

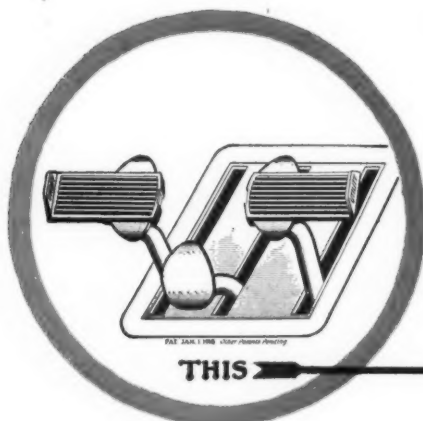
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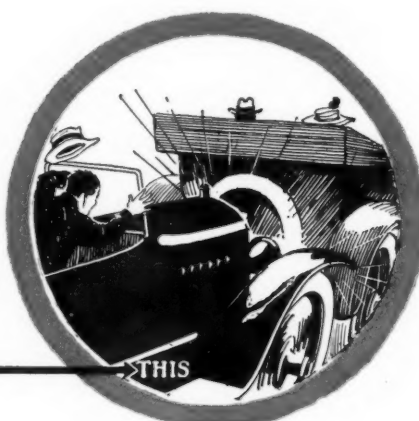
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**Hudson Motor Car Company**  
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The Utility Sure-Grip Pedal permits a firm grip on the pedal—the foot absolutely cannot slip. The heavy rubber pad and the flanges at the side prevent all possibility of a slip, even in rainy weather when the shoes are wet.

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City .....  
I am a dealer ☐  
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(Check the one that applies to you.)





# AUTOMOTIVE INDUSTRIES

*The* AUTOMOBILE

VOL. XXXVIII

NEW YORK—THURSDAY, JUNE 13, 1918—CHICAGO

No. 24

## No Sweeping Curtailment of Steel for Automobiles

Under New Agreement, System of Priorities Will Still Give Car and Truck  
Makers Practically Present Allotment—War Needs Filled First, Then  
Remainder Goes to Non-War Industries—Weekly Surveys of  
All Shipments Provided—Arrangement Is Elastic

WASHINGTON, June 11—The automobile industry will not suffer sweeping curtailment of pig iron and steel supplies as a result of the agreement between the War Industries Board and the American Iron and Steel Institute, despite newspaper reports to the contrary. Both Bernard M. Baruch, chairman of the War Industries Board, and J. Leonard Repogle, Director of Steel Products, stated to-day that such reports were erroneous.

The agreement places the control of pig iron and steel shipments directly with the War Industries Board under a system of priorities, classifying industries into seven main divisions, as follows:

- |             |                   |
|-------------|-------------------|
| 1—Ships     | 4—Food Production |
| 2—Aircraft  | 5—Clothing        |
| 3—Munitions | 6—Railroads       |
|             | 7—Railroads       |

### To Check Up All Shipments

This list indicates the order of priority which is to be followed in making all shipments of pig iron and steel. For several months steel makers have been giving priority for war materials, diverting 80 per cent of their outputs to war work and giving the remainder to non-war industries. This percentage, according to the War Industries Board, will be practically maintained.

Under the terms of the agreement, the chief object of which is to check up all steel and pig-iron ship-

ments and insure ample supplies for the war needs of the United States and the Allies, no iron or steel is to be shipped except by priority certificates issued by the War Industries Board; after the requirements called for by such priorities shall have been filled, manufacturers and producers of steel may, if any steel remains, ship it to customers not covered by priority certificates, provided such orders are embraced within the schedule of purposes entitled to preference as determined by the Priorities Board.

If after such requirements are filled there then remains any steel, a manufacturer or producer may ship it wherever he will, provided only that he first obtain the consent in writing of the Director of Steel Products.

### Status of Cars and Trucks Indefinite

In brief, war needs are to be filled first under a system of priorities; then comes a list of seven principal industries that may be served without priority certificates, if there is any steel to go around; and lastly, non-war industries are to be taken care of after all other demands have been filled. And, so that the War Industries Board may keep close tabs on exactly where steel shipments are going, every manufacturer or producer of steel must send to the Director of Steel Supply every Saturday a detailed report giving all shipments made during the week not covered by priority orders.

The agreement is not specific as to the actual

status of either passenger cars or trucks in the selected list of steel consumers. Definite decisions will be made on individual uses of passenger cars and trucks as the cases arise, according to a statement to-day by Bernard M. Baruch.

Motor trucks for army use will come under the third class, munitions.

Commercial trucks used directly for important transportation will enter into the seventh class, necessary transportation equipments. The status of motor truck and passenger cars generally, however, is not definitely decided.

In answer to the question:

"Will motor trucks used for rural motor express and return loads be classified as necessary transportation equipment?" the reply was:

"The status of motor trucks is not definitely fixed, but if this work is not mere camouflage they may be classed as necessary transportation equipment," showing that the War Industries Board is not aware of the very important motor truck work stimulated by the Highways Transport Committee, or of the fact that the U. S. Railroad Administration counts motor trucks so important that it is considering the establishment of a national motor truck transportation system.

#### Passenger Cars Not Highly Regarded

Passenger cars are not regarded highly by the War Industries Board. Discussion of them invariably took on the aspect of a good joke. During the interview the automobile industry was called an unpleasant subject. One of the highest officials was questioned:

"The Fuel Administration, last winter, classified automobiles as public utilities in its 5-day shut-down order. Will you class automobiles as public utilities and place them in the eighth division of your selected list?"

He replied that he was not the priority man, but that passenger cars would not come high on the list with him if he were. The term "pleasure cars" is used constantly by every official of the War Industries Board, despite the fact that others addressing them use the term passenger cars.

The chief object of the agreement according to Mr. Baruch is to check up all steel and pig-iron shipments, and insure ample supply for the war needs of the United States and the Allies. It has a secondary object of guaranteeing equitable division of the steel remaining above the war requirements, to each individual manufacturer large or small, not engaged in war work.

It was stated to-day that many manufacturers have complained of favoritism in steel shipments to their larger competitors by the steel makers. The license system of the new agreement is expected to provide pro rata division of the remaining steel to all manufacturers, large or small, in non-war industries.

The agreement reached between the War Industries Board and the American Iron and Steel Institute marks

the abandonment of the Board's efforts to deal through voluntary arrangements with individual industries; it marks also a clear disagreement between the War Industries Board and steel manufacturers.

The War Industries Board claims that a serious shortage of steel exists. For months it has held conferences with the automobile, steel and other industries, demanding curtailment.

The steel makers and other industries maintained that there is a sufficient supply of steel. Very recently they asked the government for a budget of the steel requirements, claiming they could meet it if they knew what demands to anticipate. The budget has not been forthcoming.

The control of steel was assumed by the government, because, the War Industries Board states, it is impossible to create a budget of the steel requirements owing to the rapid daily changes in the size of orders by the Allies and the United States Government.

A survey is being made of the steel industry and of the war and non-war requirements, according to Mr. Replogle, which will be used as a basis for increasing steel production.

Mr. Replogle added further that the new agreement will not be completely rigid. It will be sufficiently elastic so that, for example, if a large automobile company has 90 per cent of the materials on hand and needs steel to complete its inventory so that it can produce, the War Industries Board will not raise an obstacle by its priority system, but would allow the maker the steel needed to complete his product.

#### Ferro-Manganese From England

Relief from a possible shortage of ferro-manganese ore is expected to follow the action of the War Trade Board in granting permission for the importation of 12,000 tons of ferro-manganese from Great Britain. Some time ago the government prohibited such imports and since then steel manufacturers have been attempting some modification of the order.

It is expected that this action by the Board will be followed by others should the occasion arise where the industry is in need of ore. It was expected that 35,000 tons of Brazilian ore could be brought in under an agreement made 2 weeks ago, but this has been found impossible and it is stated that the 12,000 tons of ferro-manganese from Great Britain will approximately equal the contents of the 35,000 tons of Brazilian ore which were expected.

The production of pig iron has been very encouraging. During May the total output was 3,448,207 tons, which is the largest production of any May ever known and the second largest month in history, being exceeded only by October, 1916, when the output was 3,508,180 tons. The gain over April was 174,852 tons.

The Lake ore movement during the past month also established new records, the total movement of 8,792,231 tons being 2,508,619 tons greater than during May, 1917. For the season to date the total movement is 2,532,957 tons ahead of last year.

### Full Text of the Pig Iron and Steel Agreement

**BE IT RESOLVED**, by the War Industries Board, That the following agreement, reached as a result of several conferences between a committee of this board and the American Iron and Steel Institute, be and the same is hereby ratified, confirmed and approved, to become effective at once:

**Whereas**, A careful study of the sources of supply in connection with the present and rapidly increasing direct and

indirect war requirements for iron and steel products has convinced the War Industries Board of the necessity for (1) a strict conservation of the available supply of iron and steel products, on the one hand, and (2) the expansion of existing sources and development of new sources of supply of iron and steel products, on the other hand; and

**Whereas**, The producers of iron and of iron and steel



products in the main concur in this conclusion reached by the said board, and have expressed their willingness to co-operate whole-heartedly with the said board in its efforts to provide for promptly meeting the direct and indirect war requirements of the United States and its allies for iron and steel products;

Now, therefore, it is understood and agreed by the Committee on Iron and Steel Products of the American Iron and Steel Institute and the War Industries Board that no pig iron or steel manufactured products shall be shipped or delivered, except as follows:

(1) By priority certificates issued by the Priorities Division of the War Industries Board; or

(2) After priority certificates shall have been issued or filled, then producers of pig iron and of steel manufactured products may utilize such raw materials and manufacturing capacity, if any, as they may have available, to fill orders of their customers not covered by priority certificates, provided such orders are embraced within the schedule of purposes entitled to preference treatment as determined by the Priorities Board, as follows:

Ships, including destroyers and submarine chasers.

Aircraft.

Munitions, military and naval supplies and operations; building construction for Government needs; equipment for same.

Fuel, domestic consumption; manufacturing necessities named herein.

Food and collateral industries, foodstuffs for human consumption and plants handling same, feeding stuffs for domestic fowls and animals, and plants handling same. All tools, utensils, implements, machinery and equipment required for production, harvesting and distribution, milling, preparing, canning and refining foods and feeds, binder twine, etc.; products of collateral industries, such as fertilizer, fertilizer ingredients, insecticides and fungicides; containers for foods and feeds, collateral products; materials and equipment for preserving of foods and feeds, such as ammonia and other refrigeration supplies, including ice. (Including all necessary raw materials, partially manufactured parts and supplies for completion of products.)

Clothing for civilian population.

Railroad or other necessary transportation equipment, including water transportation.

Public utilities serving war industries, army, navy, and civilian population.

**Provided,** However, whenever the Priorities Board shall have promulgated and certified for observance to the producers of pig iron and steel manufactured products a revised preference list, no surplus material or capacity after filling or providing for all orders covered by priority certificates shall be used to fill non-priority orders save such as are placed by industries or plants embraced within such preference list; and

**Provided,** Further that each producer of pig-iron and of steel manufactured products shall at the end of each week, ending with midnight Saturday thereof, prepare and forward to the Director of Steel Supply of the War Industries Board a detailed statement of all shipments made during such week not covered by priority certificates.

#### Surplus Materials

**Be it further resolved,** That should any producer of pig-iron or of steel, manufactured products have any surplus war material or manufacturing capacity after filling (a) all orders covered by priority certificates, and (b) all orders embraced within the schedule of purposes entitled to preference treatment or placed by industries or plants embraced within the revised preference list, after it shall have been promulgated and certified by the Priorities Board, then in such event such surplus materials or capacity may be disposed of by such producer or manufacturer to other customers subject to the approval in writing of the Director of Steel Supply first had and obtained.

**Be it further resolved,** That the Director of Steel Supply and a committee appointed by the American Iron and Steel Institute shall jointly make a careful study of the present and prospective iron and steel requirements of each and every department and agency of the Government of the United States and of its allies, and the capacity of the iron producing and steel manufacturing plants of the United States to meet such requirements and present to this board as early as practicable (1) a report of their findings, together with (2) recommendations of measures, if any, which should be taken to stimulate and increase the production of iron and of iron and steel products in order to meet the direct and indirect war requirements and the demands of industries of exceptional or national importance.

## More Obstacles to Production Appear

### Proposal to Double Tax on Cars and Put Duty on Gasoline—List of Non-War Industries Reported in Hand

WASHINGTON, June 10.—Doubling the 3 per cent tax on the cost of automobiles, a federal license tax of from \$2 to \$10 on the users of automobiles, and a tax of one-third cent per gallon on gasoline used on all commercial gasoline engines, were among the radical tax suggestions made before the ways and means committee late last week.

A blacklist of non-war industries to be definitely curtailed, compiled by the War Industries Board, the Food Administration, the Fuel Administration, Railroad Administration and Labor Administration, is said to be in process of completion.

According to a warning issued by the Fuel Administration industries not doing 40 per cent of Government war work by October 1, 1918, will be reduced 40 per cent in their normal coal allowance. Certain industries doing 100 per cent war work and administrative consumers will receive 100 per cent coal. With those companies doing 40 per cent war work given next preference, those doing less or no war work will have little chance for a constant fuel supply.

These obstacles to normal production, together with the menace of steel shortage created by the new steel agreement described elsewhere in these columns, bring

non-war industries into a number of difficulties. The passenger car industry is, according to all reports, considered a non-war industry in Washington.

The blacklist which it is reported is being compiled is drawn up to inform the non-essential industries of their position as regards raw supplies. Washington officials believe that it will be better to definitely inform these industries what they can expect in the matter of receiving raw materials than to hold them off longer with vague promises and evasions. They point to the three important factors, labor, coal and transportation, claiming a serious shortage in all.

The report is to the effect that many manufacturers will be compelled to stop entirely, while others will be curtailed to a great degree. It is anticipated that the Priorities Board of the War Industries Board will be the departmental organization which will be the agency for working out the blacklist.

P. B. Noyes, Director of Coal Conservation of the Fuel Administration, is now warning industries to enter in the war work or suffer fuel curtailment next winter. It is claimed that the United States will fall short 60,000,000 tons of its normal coal needs for this coming winter, and there will be little opportunity for manufacturers

of non-war requirements to secure their needed quotas.

Mr. Noyes pointed out the governmental preference for the conversion of many industries rather than their curtailment. The piano industry was suggested for curtailment several months ago, and the Fuel Administration was urged to stop piano manufacturing. This was refused because piano manufacturing plants are in a position to make parts of airplanes without much expense in the way of expert equipment. In a similar manner, other industries are requested by the government to investigate their position, and definitely learn how they can best aid the government.

The Ways and Means Committee with its radical suggestions for the piano and automobile industry, and the blacklist, which is reported to place passenger cars low, together with the new steel agreement which, according to War Industries officials, will not consider passenger cars highly, present a paradox.

On one hand, witness governmental departments about to curtail passenger car manufacture until it reaches an insignificant degree. On the other hand, witness congress exacting a means for providing finances for the war, spending many hours in debate for doubling the tax on automobiles.

The various war boards and the Ways and Means Committee have also introduced the term "semi-luxury." Congress considers passenger cars a semi-luxury and votes to tax them. The war boards count passenger cars semi-luxuries and vote to curtail them. It might

be worth the time of both Congress and the war boards to visit the Congressional Library, investigating the records of Congressional activities in 1851, when Congress became exasperated over the installation of a bath tub at Mount Vernon. Bath tubs were unknown in the United States. An American from the middle west traveling to England learned to use the bath tub, and introduced one in his home. President Filmore visiting the home, and trying the bath tub, desired one in the White House.

Congress denounced the bath tub installation as a "monarchical luxury." It was called "an obnoxious toy." It was said to threaten the "democratic simplicity of the nation."

Likely had the present war been undertaken in 1852 or 1853, the war boards would have curtailed the manufacture of bath tubs or Congress would have set a prohibitive tax upon them.

ACCORDING to a statement issued by the London Master Builders' and Aircraft Industry Association, since the commencement of the war wages have been increased by nearly one-half in the case of the laborers, and one-third in the case of the skilled trades, all classes having received the same actual increase. Practically all the workmen are working overtime, and for a 60-hour week the skilled trades are receiving \$20 and the laborers \$15.

### Wedge Formation of Airplanes for Battle Duty



© Committee on Public Information

*This view, taken at Rockwell Field, San Diego, Cal., shows a fleet of 16 American battleplanes flying in battle formation*



# Some Problems of Female Labor

- 1—What kinds of work can women do?
- 2—Should they be paid the same wages and piece work rates as men?
- 3—Can women learn as quickly as men?
- 4—Are there really enough women available to meet industry's demands?

THESE were the chief questions that were asked and answered at the monthly meeting of the Employment Managers' Association, held on the evening of June 11, in Boston. That there is a widespread demand for definite knowledge as to what can be done in the use of women in what, a short time ago, were considered unusual occupations for them, was evidenced by the active discussions which followed the reading of the papers and by the large attendance of employment managers, who gathered from nearly all points of New England.

Vice-President Elmer H. Fish, who conducted the meeting, and is Employment Manager of the Norton Company of Worcester, announced the results obtained from a questionnaire which he sent out to the members of the association regarding the employment of women by them. Thirty-one concerns out of 57 who answered employ women, and these 31 concerns among them have a total of about 3000 women engaged in their manufacturing establishments. Twenty-three of these concerns pay their women the same as they pay men for the same kind of work. Eight pay their women somewhat less than they pay their men, the average running about 80 per cent of the men's rate.

## Doubting Thomases Should Learn

Every new movement and every new idea that was ever started, since the world began, has been met by the same sort of a Doubting-Thomas reception committee that has greeted the introduction of women into the manufacturing industries. The meeting of the Employment Managers in Boston, if it did nothing else, and it certainly did, emphasized again the necessity for all manufacturers in all lines to make a careful study of what has actually been done already in other similar lines in the way of employing women. As was brought out by several of the speakers, the feeling that is indicated by such expressions as "Oh, it's all right in their line of business, but ours is a special case," "Women may be able to do the lighter work, but how in the world can they do such and such a job?" can be entirely counteracted, and those who feel that way about it can easily have their minds changed for them if they will but take the trouble to advise themselves as to what women are actually doing to-day.

Mr. T. J. Dwyer of the Fisk Rubber Company said that he had seen women doing work which men had told him was too hard for them to do, such, for example, as handling the books, as they are called, in tire-making factories. He told of having seen women in a large leather plant standing before, and operating all day, huge machines which vibrated so that their bodies were in a constant state of tremor. He told of a plant where women are working in three shifts of 8 hours each for 24 hours a day. Mr. Dwyer and other speakers referred to what the women of Great Britain are doing in munition and shipbuilding plants, and pointed out cases where complete

vessels are constructed and entire plants operated exclusively by women labor.

Mr. Charles M. Lawrence of Thomas G. Plant & Co., shoe manufacturers, of Jamaica Plain, Mass., made the point that whenever changes in equipment are necessary or desirable to facilitate the work of women, these same changes in equipment will be of equal value when the work is done by men. He mentioned such equipment as chain falls and hand trucks for handling heavy pieces, the readjustment of shop methods so that the work is subdivided on a different basis, and other factors which tend to make shop work easier for women to do.

## Should Woman's Pay Equal Man's?

Those who have had actual experience in the employment of women on a large scale and on varied kinds of work, and who have studied what women are doing in outside lines, insist that the first essential in employing women labor is to tackle the problem with an open mind and with a disposition to believe that what has been done in one shop in this regard can be done in another. The answer to the question, "What kinds of work can women do?" was unquestionably and most emphatically, "Any and all kinds."

The question of the payment of women was brought to a head by a paper read by Mr. Robinson of the Crompton-Knowles Co. of Worcester. Mr. Robinson took the position that women should not be paid the same as men because of the fact that the introduction of women into the shop necessitated the incurring of certain substantial items of expense which do not have to be borne when men only are employed.

Among such items of expense are special safety requirements to guard against hair and skirts, the building of rest rooms and special lavatories, the employment of a nurse or matron, or both, and the provision, in many cases, of special entrances and exits.

Further reasons that were advanced for paying women a lower rate were that they require more help than men in lifting and moving heavy pieces; that they are restricted in their hours of labor; that in most cases they actually work a shorter time each day than do the men, owing to the fact that they are permitted to stop work before the closing time of the men in order that they may safely get out of the buildings before the rush begins; that men are required to set up machines for them, particularly in those shops where the work of the machines is varied, and where expert skill is required in adapting the machines to each special job; and that men workers object to the paying of equal rates to women.

The limit of weight which women are permitted to lift continually in the Crompton & Knowles shop is 25 lb., and the limit for occasional lifting is 75 lb. In spite of the fact that women are required to wear hair nets and caps, Mr. Robinson said it had been found necessary to

provide special protection, particularly in the case of revolving spindles, in order that the hair of the women might not get caught in it.

When his company first contemplated adding women to the shops considerable objection was encountered, said Mr. Robinson, on the part of the foremen, most of whom were old-timers in the plant, having grown up with the organization. Most of these foremen would not admit that women could be employed at all. Some, however, thought they might be used in certain places, and thus provided the opportunity to begin the experiment.

A special commission was appointed in the Crompton & Knowles plant to consider the possibilities of the use of women, and this commission met with the foremen in consultation, to work out just how and where women could be employed throughout the establishment. The opposition of the foremen was gradually overcome, and now, in nearly all cases, they are quite ready and willing to have the employment of women extended.

That the general sentiment of the meeting with regard to the relative wages of men and women was quite opposite to the position taken by Mr. Robinson was made apparent in a very short time. Evidently all of the twenty-three who answered the questionnaire referred to above, and favored the payment of women and men on an equal basis, were present, and ready to back up their opinions.

#### The Reasons for Equal Pay

Among these advocates of equal pay it was generally agreed that special set-up work on machines is just as necessary where the class of unskilled male labor now available is employed as it is where women work. In fact, it was pointed out that it is the custom generally to have a skilled man do this work for male operatives among manufacturing plants where repetitive operations predominate.

It was held that it is just as necessary to protect male labor as it is to protect female labor, and therefore what is necessary for the adequate protection of women is just as necessary or desirable for the protection of men. Furthermore, it is considered quite a simple matter, and, in fact, it is being done in many shops to-day, to require that women operatives shall dress in such a manner that the matter of hair and skirts disappears from the problem altogether.

Rest rooms and the appurtenances and appliances that go with them, it is held, should be considered as investments rather than as expenses, in that it is generally recognized in this day and age that they yield a very definite return.

#### Women Learn Quickly

Dealing more particularly with the work itself within the shop, as has already been mentioned, several speakers, including Mr. Lawrence, asserted that it is a demonstrated fact that whatever readjustments of shop methods or practices will better adapt the work to be performed to the limitations of female labor have just as great advantages when applied to the efforts of men.

Even in set-up work, where expert skill is required, women can eventually be trained to take the places of men, and in some cases have already been trained to this high degree of mechanical skill and efficiency in many establishments.

On the subject of training women, for some reason, there was not so much discussion as there might have been, and the advantages of special training schools in factories apparently have been overlooked, or not yet fully appreciated, by many of the members of this particular association. Those who spoke of training indicated that what has been done along this line, so far, has been accomplished within the shop itself, under the direction

(Continued on page 1157)

## Government May Assume Control of Labor

**I**T would seem that at last the great folly of and extravagant waste resulting from present methods and practices in employing labor through raising wages and "stealing help" have impressed themselves so completely upon the authorities in Washington and particularly upon the Department of Labor that we are likely to see an end put to them very shortly.

It is understood that by the first of August of this year the Department of Labor through its various bureaus and agencies scattered throughout the country will take complete charge of the labor situation and pretty well control the labor supply and dictate how it shall be used, very much after the manner in which the Fuel Administration at the present time controls the supply of coal. The supply of labor, and more particularly of unskilled labor, will be distributed for agricultural work and among the industries of the country on a priority basis which will consider the relative importance of the industries in the winning of the war.

According to expectations, there will be an abundant supply of unskilled labor, at least for all so-called essential industries, and this supply will be corralled and classified by the agencies of the Department of Labor, who will make an inventory of the country's entire labor supply.

A most important part of the plan, as we understand it, is that restrictive measures of a radical kind will be applied to the employing methods used by individual concerns. Among these measures, it is reported, will be the prevention of advertising for labor except in a manner

and style approved by the Department of Labor. The stealing of help, as many call it who have suffered from this pernicious practice, will be prohibited, and the lever which the Department will employ in enforcing its mandates will be the withholding of materials from those concerns who transgress its rules.

Companies will be permitted to hire those who voluntarily apply for employment within certain restrictions which have not as yet been definitely determined. It is also said that the Department of Labor will work up a schedule of wages for various lines and various grades of labor, which schedule will have to be maintained by employers.

It is apparent to all that the present chaotic state of things relating to the labor market is working an incalculable injury to the manufacturers of the country. It is generally granted that the present high rate of labor turnover, the steady increase in wages and the difficulty, amounting in some cases almost to an impossibility, of securing the special kinds of labor needed are due in a very large measure to the practices now in vogue among employers of labor and to competition in the wages and other inducements which is more or less running riot.

There is a general feeling among manufacturers that some controlling plan, such as that outlined above, would be of general benefit to all lines of trade, and it is therefore expected that both as a patriotic duty and as a purely business measure it would have the hearty co-operation of all concerned.



# An Accurate Method of Testing Gear Drives\*

By Determining Directly the Loss and the Input Much More Accurate Results Are Obtained Than by the Usual Method of Measuring Input and Output

By C. M. Allen and F. W. Roys

**A**PPARATUS for determining the efficiency of gears and other drives has recently been developed and used for making tests in the Mechanical Engineering Laboratories of the Worcester Polytechnic Institute. The fundamental principle of the apparatus consists in the direct measurement of the loss of power in the gear drive instead of the usual method of determining the input and output and subtracting one from the other.

Since the efficiency of good geared drives is relatively high, the input and output are very nearly equal, and any small errors in the measurement of these relatively large quantities will make a very large per cent error in the difference, which is the power loss.

It is therefore evident that a method by which the loss may be measured directly and independently of the input and output would be very much more accurate.

## Theory of Apparatus Used

The theory of the apparatus which was used in the tests is as follows: An electric motor is so hung in a cradle that both its armature and field are free to turn. The armature shaft is connected directly to the pinion gear shaft and the driven shaft directly to an Alden absorption dynamometer. The reaction of the motor field is balanced by the action of the absorption dynamometer through a simple lever. The arms of the lever are accurately proportioned to the ratio of the gears.

The general idea of the apparatus is as follows: An electric induction motor is hung in a cradle on double roller bearings, and an arm attached to the motor casing makes a cradle dynamometer. The motor shaft is connected directly to the drive shaft and an Alden dynamometer is put on the driven shaft. These dynamometers are so arranged that the force exerted by the end of the arms is downward. The arms of the dynamometers are of equal length and at the end of each is a fixed knife edge. A lever with three knife edges mounted upon it has the two outer knife edges adjusted so that the distance between them is equal to the distance (horizontal) between the dynamometer knife edges. The third knife edge divides this distance into segments whose ratio to each other is the same as the gear ratio. These three

\*Paper presented at the summer meeting of the American Society of Mechanical Engineers. Condensed.

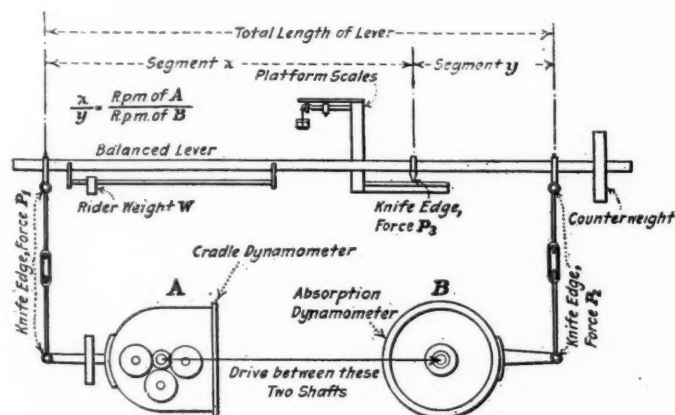


Fig. 1—General arrangement of apparatus

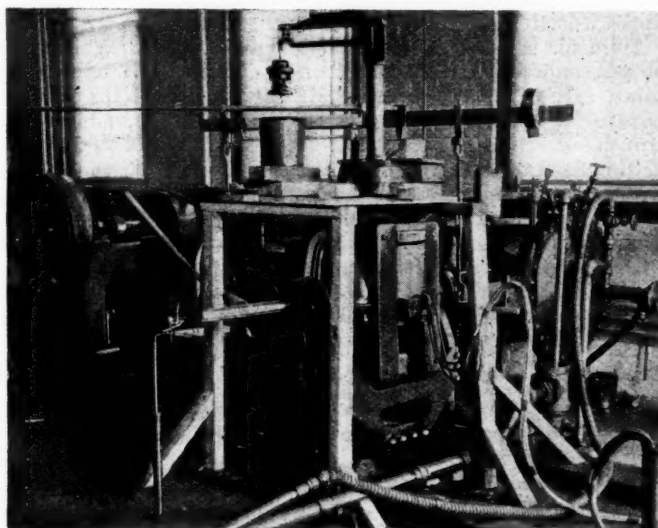


Fig. 2—The testing apparatus

knife edges lie in the same straight line. The lever is now placed directly over the line between the dynamometer knife edges, and is supported by the third knife edge, which rests on platform scales. The end knife edges of the lever are connected to the dynamometers in such a way that the high-speed dynamometer is connected to the long arm of the lever. A counterweight and a rider weight are mounted upon the lever. See Fig. 1.

## Method Identical for All Tests

The method of testing, so far as the operation of the lever system is concerned, is identical for all tests, and therefore the explanation of its action is made general.

The center of gravity of the Alden brake was very nearly in the horizontal plane, so that a slight movement of the arm did not measurably affect its balance. The cradle dynamometer was so loaded that its center of gravity was only a short distance below the shaft center, and a load of 2 lb. at the end of the arm was enough to entirely upset its equilibrium. The lever was then placed in position as described above and statically balanced by means of the counterweight shown in Fig. 1. A long pointer attached to the lever showed the position of the system relatively to the initial condition of balance.

When the rider weight  $W$  was in its initial position, the load  $P_3$  (see Fig. 1) was noted as the initial reading of the platform scales.

The variables entering into the balance of this apparatus are then the forces  $P_1$ ,  $P_2$  and  $P_3$ , and the displacement of the rider weight.  $P_3$  may be measured at any time while the apparatus is in operation and so may the displacement of the rider weight.

It should be noted here that the amount of  $P_3$  has nothing to do with the calculation of the power loss, which is found as follows:

It will be seen from the preceding description and from Fig. 1 that  $P_1x = P_2y$  for 100 per cent efficiency; but since

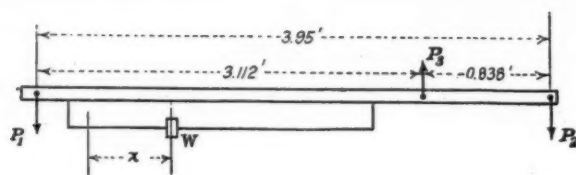


Fig. 3—Dimensioned sketch of apparatus

the efficiency is never 100 per cent,  $P_1x$  must exceed  $P_2y$  by the amount necessary to overcome the loss in moment. This difference immediately upsets the balance of the lever, of course, but equilibrium may again be restored by shifting the position of the rider weight in the proper direction. This displacement of the rider weight is therefore a measurement of the change of moment, and when corrected for the speed of the apparatus it is a measurement of the power loss.

Here the input power is automatically balanced against the output and any little change in the latter is immediately taken care of by the motor, and it is impossible for the apparatus to be out of balance except by the amount of the transmission loss. This is the feature of the method which distinguishes it from all others.

The power transmitted by the drive may be computed by noting the change in the load  $P_2$  on the platform scales, and such computations will be shown later.

In operating it was found necessary to start the apparatus and let it run for several minutes before taking note of the initial position of the lever. The zero reading was frequently checked during the period of testing.

#### Efficiency Test of Bevel-Gear Drive

The gears were 5 per cent nickel steel, case-hardened, 5 pitch, 1½-in. face. They were cut by the Brown & Sharpe Mfg. Co. and were mounted by them on ball bearings especially designed for testing purposes. Fig. 2 shows the apparatus set up for this test. Following are the preliminary data employed:

Number of teeth in gear.....	52
Number of teeth in pinion.....	14
Ratio, 52 ÷ 14.....	3.714
Total length of lever between outside knife edges (see Fig. 3)	3.95 ft.
Length of long arm of lever.....	3.112 ft. = 37.344 in.
Length of short arm of lever.....	0.838 ft. = 10.056 in.
Length of dynamometer arms.....	31.5 in.

A force of 2 lb. at 31.5 in. is equivalent to 1 hp. at 1000 r.p.m., for which the expression  $1 \text{ hp}_{1000}$  will be used.

Referring to Fig. 3, a force of 2 lb. at  $P_1 = 1 \text{ hp}_{1000}$ . Therefore  $2 \times 37.344 = \text{in.-lb.}$  of moment in lever necessary for  $1 \text{ hp}_{1000}$ , and if the rider weight is 3 lb., then for this to balance  $1 \text{ hp}_{1000}$ ,  $3x$  must equal  $2 \times 37.344$ , whence  $x = 24.893$ , and therefore a movement of 24.893 in. of the rider is equivalent to  $1 \text{ hp}_{1000}$  for a 3-lb. rider.

If the rider weighs but 1½ lb., then the same displacement means only ½  $\text{hp}_{1000}$ . A paper scale was made according to these figures and was fastened to the lever. The readings for horsepower loss were taken from it throughout the test.

#### Calculation for Horsepower Input

Referring to Fig. 3, since the initial load of  $P_2$  was taken with the rider weight  $W$  already on the lever, a change in the position of  $W$  does not change  $P_2$ , but merely changes the moment. Therefore, in moment equations of the lever, regardless of where the center of moments is taken, the arm of the moment of  $W$  is always the distance from the zero position.

The force  $P_1$  is a measure of the input power if the speed is known, and it is merely necessary to calculate this value in order to solve the problem. Considering the moment equation of the lever, we have

$$0.838 P_2 - 3.95 P_1 + Wx = 0$$

whence

$$P_1 = \frac{0.838 P_2 + Wx}{3.95}$$

If  $W = 3 \text{ lb.}$ ,

$$P_1 = 0.2122 P_2 + 0.759 x$$

if  $W = 1.5 \text{ lb.}$ ,

$$P_1 = 0.2122 P_2 + 0.379 x$$

$x$  being the displacement of  $W$  measured in feet.

In figuring hp. input it is necessary to use the value  $P_1$ , which is obtained by means of the equation  $P_1 = 0.2122 P_2 \times 0.759 x$ . The maximum variation in feet from the mean position of the rider was less than 0.1, but suppose it had been 0.1. Then in one particular measurement the value of the  $x$  might have been 1.8 instead of 1.7. To see what the effect of such a discrepancy would be, the following computations have been made, taking  $x = 1.8$  and  $x = 1.7$ , respectively:

$$P_2 = 200; \quad 0.2122 P_2 = 42.44$$

$$P_1 = 42.44 + 0.759 x$$

$$= 42.44 + (0.759 \times 1.8) \text{ or } = 42.44 + (0.759 \times 1.7)$$

$$= 42.44 + 1.36 \text{ or } = 42.44 + 1.29$$

$$= 43.80 \text{ or } 43.75.$$

As  $\text{hp}_{1000} \text{ input} = \frac{1}{2} P_1$ , then  $\text{hp}_{1000}$  equals either 21.90 or 21.865, and

$$\frac{\text{Hp. loss}}{\text{Hp. input}} = \frac{\text{Rider hp}_{1000}}{\text{Input hp}_{1000}}$$

whence

$$\text{Loss of efficiency} = \frac{0.746}{21.90} \text{ or } \frac{0.746}{21.855}$$

It is thus seen that, measuring as accurately as possible, the numerator is only accurate to the second place, the third being in doubt; and that the second place in the denominator is sure and the third fairly sure, although considered in doubt. Therefore the denominator is as accurate as the numerator.

The numerator is as accurate as the apparatus will allow data to be read, and therefore the inaccuracy of the values for  $x$  obtained has no effect on the final accuracy of the work.

In Test No. 1 practically no lubrication was used, the gears having been washed off with gasoline. Previous to this there had been oil and graphite on the gears and some of the graphite still remained on the teeth. However, after running for a while they were practically non-lubricated. The 3-lb. rider had to be used in this case because of the amount of the friction loss, which, by the way, was sufficient to cause the gears to heat considerably.

The next test was made to see how much the efficiency would be increased with good lubrication. Accordingly some heavy oil and flaked graphite were mixed and used as a lubricant. The efficiency was so much increased that the 1½-lb. rider weight was sufficient, and again it was found that the same results were obtained time after time. Later, after the graphite and oil had become more perfectly blended, another test was made.

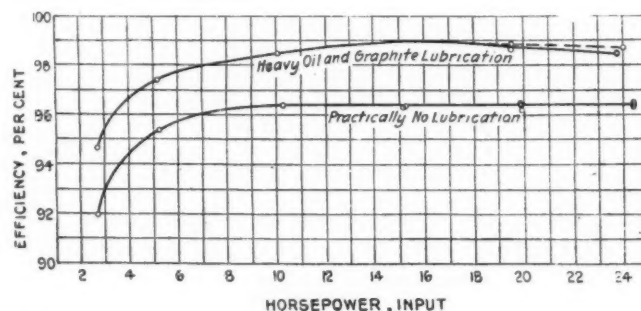


Fig. 4—Horsepower-efficiency curves of bevel-gear drive. Gear ratio, 26 to 7; r.p.m. of pinion, about 1200

The efficiency curves for these three tests are all given in Fig. 4. The difference between the results of non-lubricated and lubricated conditions is perfectly clear. The test with the more perfect blending of the lubricant showed results identical with the previous one except as indicated by the dash line at the end of the upper curve. This showed that the lubricant was not squeezed out from between the teeth at quite so low a pressure.

The form of the curves and the consistency of the readings convinced the experimenters that very reliable results had been obtained.

#### Efficiency of Worm-Gear Drive

The gear was made of phosphor bronze with 40 teeth; pitch diameter, 10.5704 in.; throat diameter, 10.9964 in.; circular pitch, 0.8302 in.; angle of teeth with axis, 38 deg. 16 ft.



5 in.; normal circular pitch, 0.6518 in.; thickness of tooth, 0.3568 in.

The worm was made of Aurora steel, case-hardened, and had 9 teeth; pitch diameter, 3.015 in.; outside diameter, 3.441 in.; circular pitch, 1.0524 in.; angle of teeth with axis, 51 deg. 43 ft. 55 in.; thickness of tooth, 0.295 in.; lead, 7.4719 in.

This drive was made by the Brown & Sharpe Mfg. Co., and mounted by them in a ball-bearing case especially designed for the purpose of testing. The set-up of the apparatus was the same as for the bevel-gear tests (see Fig. 3), except that the positions of the knife edges on the lever were changed to agree with the new gear ratio, giving the following dimensions:

Number of teeth in gear.....	40
Number of teeth in worm.....	9
Ratio, $40 \div 9$ .....	4.444
Total length of lever between outside knife edges.....	3.645 ft.
Length of long arm of lever.....	2.9755 ft. = 35.72 in.
Length of short arm of lever.....	0.6695 ft. = 8.04 in.
Length of dynamometer arms.....	31.5 in.

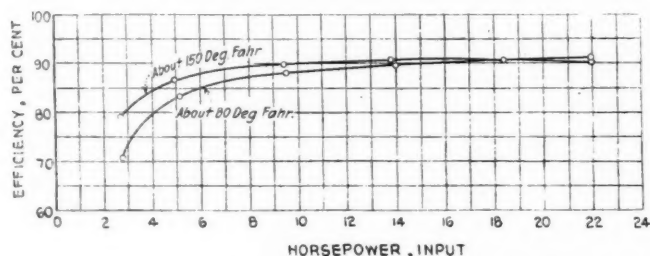


Fig. 5—Efficiency of worm gear drive at two different temperatures

The calculation for horsepower loss in this case is the same as for the bevel-gear test except for the change in length of the lever arm and the weight of the rider. In this test a 6-lb. rider was used and the equation is as follows:

$$6x = 2 \times 35.72$$

from which

$$x = 11.91$$

therefore a movement of 11.91 in. of the rider is equivalent to 1 hp<sub>1000</sub> for a 6-lb. rider. A paper scale laid out according to these figures was used throughout this test.

#### Calculation for Horsepower Input

The equations are of the same form as those for the bevel-gear test and the figures are as follows:

$$0.6695 P_2 - 3.645 P_1 - Wx = 0$$

and for  $W = 6$ ,

$$P_1 = 0.1837 P_2 - 1.647 x$$

$x$  being the displacement of  $W$  measured in feet.

Considerable trouble was experienced at first in getting the initial balance of the apparatus, as it was not at all sensitive. However, it was soon found that the weight of the Alden dynamometer caused a deflection of the shaft and consequently friction on the oil-retaining ring of the gear case, which had a very small clearance. When the weight of the dynamometer was taken from the shaft by means of a cord passed around the hub and an equalizing bar above, to which the ends of the cord were attached, the apparatus became sensitive at once. The purpose of the equalizing bar was to lift the weight without introducing any moment for slight movements of the dynamometer casing.

This apparatus ran without anywhere near as much vibration as the bevel-gear apparatus and it was accordingly easier to handle.

A heavy oil sold by the Texas Company under the name of Thuban oil was used for lubrication. The power loss in these gears was so large, however, that the temperature of the oil bath increased very rapidly. No tests were run to determine the limit of this rise or rate of increase, but tests were made at certain selected temperatures.

By testing at constant temperature the effect of the change in viscosity of the oil on the action of the lever was eliminated, but the effect on the efficiency is clearly shown by the curves in Fig. 5.

It is of course obvious that no test could actually be made at constant temperature, and the tests were really made by keeping the load constant and noting the loss as the temperature went up. These readings were recorded, however, as if the tests had been constant-temperature tests.

It is interesting to note in Fig. 5 that at the lower temperature, when the oil was viscous, the efficiency at light load was quite low, while at the higher temperature the efficiency increased, as one would expect, on account of its taking less power to churn up the thinner oil. But at the other end of the curves, that is, the high-power end, the reverse condition is found, indicating the inability of the oil to maintain proper lubrication at high tooth pressures when it becomes thin.

Again the form of the curves and the consistency of the data obtained point to the reliability of the apparatus. It is accordingly concluded that this apparatus will measure accurately the efficiency of any positive shaft drive where both shafts are rotating at constant speed, and that it seems to be the best method yet devised for testing gear drives for efficiency, since it measures directly the actual power loss.

## Cotton for Airplane Wings

IN a paper "The Textile Industry in Relation to the War," which he read before the Spring meeting of the American Society of Mechanical Engineers at Worcester, J. E. Rousmaniere said that until recently it was thought that only linen would do for airplane wings. Cotton was thought to be unsuitable because of a marked tendency to expand and contract with variations in the amount of moisture present in the air and also because of a disposition to tear easily when shot through.

Experiments were made with mercerized yarn and they have shown that cotton so treated makes good airplane cloth and it is now said that such cloth is standing up as well as linen. Battleplane wings are still covered with linen, but cotton is used on practice and bombing planes.

When first tried out there was a feeling among aviators that they were not getting such good machines in the cotton wing airplanes, and they manifested some hesitancy about using them. A little actual experience in flying, however, soon demonstrated that the cotton wings are entirely satisfactory and this feeling on the part of the aviators is said to have entirely disappeared.

## Universal Terminal Cleaner

IN the maintenance of storage batteries it is very important that the terminals be kept perfectly clean, as otherwise the connection will be poor and a loss of power in starting will result. The acid in the electrolyte has a tendency to corrode the terminal, and occasional cleaning is necessary. This is usually done with a knife or scraper, but a tool specially suited for the purpose, known as the Universal terminal



Sander's storage battery terminal cleaner

cleaner, has been placed upon the market by T. J. Sander, Reading, Pa. As illustrated herewith, the tool is of such design that it will deal with terminals having any degree of taper. The cleaner adjusts itself to the taper on the terminal and cleans same with one or two turns. It is claimed that it only removes the oxide and does not enlarge the hole in the terminal. The retail price is \$2.

THE secretary of the Decimal Association reports that at the annual meeting of the Associated Chambers of Commerce, held on April 9 and 10, a motion was passed urging the Government to pass into law the Decimal Coinage Bill, prepared by the Executive Council of the Associated Chambers of Commerce in conjunction with the Institute of Bankers and the Decimal Association.

# Automobile Tax Hearing Before the Ways and Means Committee

Congressmen Favor Higher Tax and Are Not Interested in Size of Industry—  
Want to Know Relation of Industry to War

WASHINGTON, D. C., June 12—The hearing to-day of the automobile industry represented by the National Automobile Chamber of Commerce, before the Ways and Means Committee on the formulating of a new automobile tax to increase war revenue, established the fact that Chairman Claude Kitchin, while realizing that the automobile is an essential and a necessity in transportation, thinks that greater revenue is necessary and apparently the automobile industry must contribute its share.

The case of the N. A. C. C. was presented by Alfred Reeves, who declared that the industry was vital to the transportation necessities of the country to-day, and because of this should not be classified with jewelry, cosmetics, etc., and be subjected to a 3 per cent tax the same as these. His talk, which is reproduced in full in this issue, was to the effect that automobile production should be encouraged on the ground that it is a necessity rather than that it should be crippled by additional taxation. Mr. Reeves cited that many of the automobile manufacturers have failed in business which was given as an example of the injustice of the tax. He made the statement that the great use of passenger cars by farmers, doctors and business men was an indication of their essential nature.

Those on the Ways and Means Committee asked Mr. Reeves a great many questions after his address was concluded and many of them were not apparently satisfied with the nature of information given and indicated how they consider the industry.

Chairman Kitchin, while seriously considering increasing the present tax, admitted the necessity of the automobile by stating that in the city of Washington the entire street car transportation would collapse if the automobile were abolished.

The congressmen in general took the ground that an added tax would not prove a prohibition in the use of automobiles.

Chairman Kitchin told that at the hearings last year the Packard Motor Car Co. stated that it would suffer seriously if the tax were passed, and despite the tax is doing bigger business than ever. He also stated that the tax on Packard cars amounted to \$75 and showed that the Packard company had increased its price from \$850 to \$1,000, asking why the increase had been made and if the public could stand such large increases why it could not also afford a doubling of the tax.

Most of the congressmen were under the impression that the passenger car makers were also the truck makers and were therefore being compensated for any loss in normal business by the war truck orders.

They wanted especially, however, to know if it would not be wise to curtail the industry by a high

tax so that the workers and materials could be devoted to war work. Further, they inquired as to the amount of labor now devoted to passenger car manufacture, the kinds and amounts of materials used, the uses of the passenger cars, the amount of war work being done by automobile makers, the percentage of war work as compared to passenger car work, etc.

This and the other information asked for was unanswered, the information not being available.

Assertions by the congressmen that tungsten steel needed for airplanes had increased 400 per cent in price because of the use of it in automobiles went unchallenged despite the fact that tungsten steel, according to an official here, is being stored away in California in order to keep up the price.

The statement was also made that 60 per cent of high-speed steel needed for munitions work is being used in automobiles and the question was asked if this should not be stopped by abolishing the automobile industry. Mr. Reeves, not questioning the figures, agreed that the industry should be abolished if the good of the country demanded it.

Congressmen were with few exceptions not impressed by the arguments presented. They were not interested in the size of the industry, its classification or the number of manufacturers who have failed. They were after pertinent information relative to the industry as regards the war. Further, they brought up many of the statements made opposing the original 3 per cent tax, and attempted to show the fallacies of that opposition by the developments following the enactment of the tax.

It was asked of Mr. Reeves if the present tax had curtailed the industry as he claimed and if so why the revenue from the tax would amount to \$32,000,000 this year—several millions more than were anticipated.

The fact that most of the manufacturers are behind in delivery and unable to meet the demands was brought out in refutation of the claim that the makers were suffering a burden from the present tax. Further, the congressmen by questioning Mr. Reeves, showed that the present tax is being passed on to the consumer directly, each bill of sale showing the war tax.

Congressman Gardner of Texas, firmly opposed to further production of passenger cars, quoted England as an example and told of the reduction there and the need in this country for labor and materials which he thought should come by curtailment of the automobile industry through high taxation. He quoted Professor Sprague of Harvard University who he said in an address before the committee told that automobiles were purely pleasure vehicles which should be prohibited in manufacture. Professor Sprague, stated the congressmen, suggested



the conversion of all automobile factories to munitions work and further advocated a tax of \$10 per month on every employer of a chauffeur.

In a final summing up Mr. Reeves told that the buggy business, which formerly amounted to the production of 1,125,000 buggies per year had decreased to less than 200,000 annually and showed by this

that the automobile replacing the buggy is doing utilitarian work—he went in detail following questions regarding the number of automobiles in the various states and showed that Iowa has one automobile to every six people and proved that passenger cars are being used to a very great extent by farmers.

## Statement Made By Alfred Reeves Before the Ways and Means Committee

"THE original tax under war revenue act of Oct. 3, 1917, of 3 per cent on automobiles, grouping them with piano players, talking machines, jewelry, perfume and chewing gum, was doubtless placed on the theory of taxing articles that were non-utilitarian.

"The automobile industry, the third largest manufacturing industry in the country, depreciates the placing of automobiles with the articles enumerated, because during the past decade, both passenger and freight vehicles have entered so largely into the personal and business use of our people, that they must be considered articles of great utility.

"These time-saving vehicles have so increased our efficiency that their disuse or any marked decrease in the number in use would be nothing short of a disaster at this time when the speedy movement of persons and commodities is of such vital importance.

"It is hoped that no favorable consideration will be given to any plan of taxation that will discourage the purchase and use of motor cars, which are such great factors in our fast moving American life.

"The making and use of automobiles should not be discouraged because:

"1—The industry ranks third in manufacturing importance. Employs more than 800,000 people, who with dependents would populate several of our States; pays annual wages approximately equal to all the gold in circulation in the United States; employs capital of more than \$1,250,000,000, exceeding by \$250,000,000 the capitalization of all the national banks; produced finished products of nearly \$1,000,000,000 in 1917. An important part of the war program is, and should be, the maintaining of industry to the fullest possible extent.

"2—The passenger mileage of automobiles exceeds that of the railroads by more than 10,000,000,000 passenger miles; they carried 3,000,000,000 more persons than the railroads carried in 1915; the value of this passenger mileage at 2 cents per mile would have been \$900,000,000.

"It would be impossible to adequately replace this service under present conditions by any other former transit. A recent investigation developed that the farmers in Livingston County, Illinois, bought 73 per cent of their automobiles as a necessary part of their farming equipment, 25 per cent for both business and pleasure. And 2 per cent for pleasure alone 2,000,000 of the automobiles in use are owned by farmers. Nothing could be more disastrous to-day than to interfere with the efficiency of the farmer. Dr. H. A. Garfield, fuel administrator, rules automobiles to be public utilities. Herbert Hoover buys new car, although giving up chauffeur driving vehicle.

"3—No automobile is exclusively a pleasure car. The most expensive machines are used more or less in a utilitarian way. There can be no danger that so-called pleasure use of automobiles can be permitted to become wasteful of gasoline, because Mr. Requa, oil director of the Fuel Administration, has ample power to enforce any rules necessary to conserve fuel.

"4—There are 5,000,000 passenger automobiles in use to-day; probably 850,000 per

year will wear out. If production is not kept up residential suburbs would become to a considerable extent impracticable, tending to greater congestion in cities; local and suburban transportation facilities would be inadequate; suburban and farm values would decrease tremendously; the efficiency of farmers would be impaired very greatly.

"5—Automobiles are the greatest economizers of time of farmers, doctors, contractors, builders, salesmen and men engaged in all business.

"6—They increase efficiency of individual when farm labor is scarce; physicians are assuming the practice of doctors who have gone to France and manufacturers are called on for increased production. There are 150,000 doctors in the United States.

"7—Railroad service has been curtailed, and many valuable hours will be lost by business men if use of the automobile is curtailed.

"8—Automobiles have been used most liberally in the campaigns for sale of Liberty Bonds and War Saving Stamps, to raise war funds for the Red Cross and Y. M. C. A., in recruiting and in many other ways connected with war activity. To discourage the sale of automobiles will make these activities less efficient.

"9—Further reduction of manufacture will force out of business a large proportion of the 27,500 dealers and 25,000 garage owners, whose livelihood is derived solely from sales and care of motor cars and accessories and who are located in every town and hamlet in America.

"10—Eleven big companies made 85 per cent of the cars in 1917; more than 200 manufacturers produced only 15 per cent of all the passenger cars made.

"These are the ones who will suffer most from any increased taxation, because their profits are smallest and they are unable to secure war contracts to keep their plants in operation. There are bound to be many failures among them. Forty-nine failed or went out of business since last October.

"11—With growing scarcity of foods, the use of the automobile instead of the horse should be encouraged. Every horse continued in use represents 5 acres of land and the necessary labor to produce oats and hay and other feed diverted from the production of human foodstuffs.

"12—The automobile is one of the greatest utilities we have and renders a passenger car service exceeding that of the steam and electric railroads combined. By no stretch of imagination can it be classed with intoxicating liquors, cosmetics and so-called non-essential luxuries.

"13—To replace the cars that are worn out an annual production of about 850,000 cars is necessary, the average life of an automobile being figured at approximately 6 years. Production thus far in 1916 was at rate of only about 1,000,000 a year.

"14—A tax on this article with any thought of arresting its production seems unwarranted; the question of how many machines should be produced is one of materials and labor, and production should be maintained on a basis consistent with these conditions. This is a matter entirely apart

from taxation and is being dealt with by another arm of the government, the War Industries Board.

"15—It is unfair to compare the motor vehicle industry of this country with that in European countries. England has only 260,000 passenger cars and imports all her gasoline, whereas as in this country we have seven states each which has more than 200,000 cars (New York leading with 331,000), while gasoline production here is almost 7,000,000 gallons a day, according to the Bureau of Mines report.

"16—It is a great economic mistake to reduce this output and disarrange organizations important to the prosecution of the war more than our own conditions as to material and labor make it absolutely necessary. The more restricted because of these reasons the greater misfortune.

"17—Holding great automobile organizations for war work seems vitally important at this time and scores of the automobile plants are now doing government business, with many other companies asking for similar work.

"The government should add no undue burdens to this great industry; it should be maintained as fully as economic conditions will permit in order that such a vital and large part of our community may be in position to participate in government loans, income and other taxes and in other ways.

"It is to be regretted that the automobile industry as a whole is sometimes judged by the glittering successes of a few companies. Probably no other business presents the same mortalities during the past 8 years, our lists showing 760 companies that failed or went out of business during that period. Since last October, when the new revenue bill was passed, there have been forty-nine companies that failed or went out of business. The 450 manufacturers of motor vehicles and the 825 manufacturers of motor vehicle parts and accessories and the 52,000 motor vehicle dealers and garages, with their more than 800,000 employees, constitute an important part of our manufacturing business labor community. Greater loyalty to our present cause exists now here and it is their earnest desire to pay for any equitable tax in their power that is considered necessary for the prosecution of the war. If it is considered necessary and wise to raise revenue by a manufacturing tax on essential articles, with which the motor car must be classed, there will be no complaint or objection, but it would then naturally follow that the quota necessary would be so distributed over a wide variety of articles so as not to be so burdensome on any one.

"With their business dwindling owing to advanced price due to increased cost of labor and material and of which this tax also forms a part and with a realization keener than others owing to their close contact with the subject that motor vehicles are vitally essential to our national efficiency, the manufacturers ask you to now reconsider and come to an appreciation of the point that an economic error is being made in grouping motor vehicles with non-essential articles for revenue raising purposes.

"It has always been felt that a great injustice was done to the motor truck when it was included in the last war revenue bill with perfumes, sporting goods and musical instruments and subjected to a tax of 3 per cent. There can be no argument on the statement that motor freight vehicles should be taxed only under a plan of taxing articles of use and necessity. The motor truck has so demonstrated its ability to operate not only in motor trucking field, but as a long haul substitute for inadequate railroad facilities and for marketing farm produce that this has become self evident.

"In its consideration of tax measures by the members of the Ways and Means Committee it is hoped that the tax on the automobile manufacturer will not be increased to a point where it would disturb the making or use of the motor car, which is now such an important factor in adding to the efficiency of the nation because of its ability to transport men and materials in the shortest possible time and to the needed relief of the railroads."

# Effects of Proper Housing on Labor Turnover

Results of a Questionnaire Conducted by a Construction Company—The Norton Company's Workmen's Colony at Indian Hill

By Julian C. Chase

MUCH attention was given to the labor problems of the production engineer at the spring meeting of the American Society of Mechanical Engineers, held June 4 to 7 at Worcester. As these problems rank foremost among the difficulties to be overcome at the present time, it is but natural that keen interest was manifested in the papers on the subjects which were presented.

The effect on production and labor turnover of proper housing of employees, vocational training in vestibule schools, of the scientific management of employment departments and of other matters pertaining to employees' relations work was gone into thoroughly.

## Difficult to Calculate Value

One thing that was quite apparent from what was said in the papers and addresses is that while there is abundant evidence that welfare work, specialized training and the careful selection and distribution of labor have accomplished an immense amount of good, it is difficult to calculate the exact amount of benefit derived in dollars and cents or increased production because of the fact that working conditions have changed greatly and the quality of labor available has unquestionably deteriorated.

It is always difficult and usually impossible to measure what might have been or to say what might have happened if a certain thing had not been done or a given course had not been pursued. So it is with modern or advanced methods and modes of handling labor. What has been accomplished—and it is felt that it is a great deal—is chiefly to maintain the results of the more favorable conditions of a few years ago under the much less favorable conditions of to-day.

## Poor Housing Causes Labor Unrest

A very able paper was presented by Leslie H. Allen of the Aberthaw Construction Co., in which the writer took up the effect of improper and inadequate housing on labor turnover. Increased wages and shorter hours, he said, have not brought the workman wealth and happiness, largely because the workman is unable to secure a comfortable home in which to spend and enjoy his hours of leisure. If he earns high wages, rents are raised by landlords generally and prices of other commodities go up in like manner, and in growing centers of industry houses are usually impossible to obtain.

At the present time, when the cost of building is so high, new houses are not being built to accommodate the growth of population or its concentration in industrial centers engaged in munition work and shipbuilding, and the result is an altogether disgraceful amount of overcrowding. It is becoming the rule rather than the exception for two or even three shifts of men to occupy the

same beds in overcrowded rooms, and it is practically impossible for any workman, skilled or unskilled, coming to a new town to bring his family with him; he has to come alone and crowd in as lodger with others.

## Cause of High Labor Turnover

Recent investigations have shown that one of the most important causes of the present abnormal labor turnover is the lack of sufficient homes to house the population around industrial plants and the altogether unsatisfactory nature of such houses as there are.

Ten years ago we should have felt rather ashamed of a turnover of 100 per cent per annum. Many large plants now consider themselves very fortunate if they can get below 200 per cent and some authorities assert that it runs up to 400 per cent. Those who do not keep track of their figures may be inclined to dispute this. But those who through their employment departments keep records of their labor turnover will unanimously bear out the general statement.

The fact is that in spite of high wages the living conditions in our manufacturing centers are so miserable that a workman cannot endure a long stay in one place, and he soon throws up his job and moves on to the next town for the sake of a change, in the vain hope that he will find something better than the conditions he has just left. Such men, separated from their families, and roaming from place to place, soon degenerate into the "floater" class that is such a big problem to our employment departments.

In order to bring out more clearly the importance of good and adequate housing as a means of reducing labor turnover, the Aberthaw Company prepared and circulated a questionnaire among employers of labor, asking for figures on their labor turnover and on the character and sufficiency of the house accommodations around their plants. Prior to this, as far as could be ascertained, no data had been assembled on this relation, although the opinion has been widely held that housing has an important influence on labor.

## 840 Replies Received

Eight hundred and forty replies were received, containing a mass of most interesting information. The replies were from typical plants in the eastern and middle-western states, some in cities and some in small towns, and may be taken as a fair average statement of conditions.

Only a small proportion (18½ per cent) of those who answered kept any record of their "hiring and firing," and of those who had kept records on turnover nearly a third had started keeping their records within a year.

Very few of those answering stated that they housed all their help, but 17 per cent owned some houses.

In answer to the request for an expression of opinion



as to the influence of good housing, nearly all replied that it was a benefit to a manufacturing plant, tended to hold the men and made them more contented and happier, but there was some division of opinion as to whether it reduced time lost through sickness.

The opinion is held by all manufacturers located in large cities, such as New York, Philadelphia and Buffalo, that in very large communities housing has no bearing upon labor supply—with the exception of one firm in Detroit, which attributes a large reduction in turnover to selecting its new employees from those who live within half a mile of the plant. No firm in a very large city shows any interest in housing, although in many cases the turnover is just as large. Whether this opinion is a correct one due to there being an excess of supply over demand for houses or for labor or both, in our big cities, or whether the opinion is fallacious, we are unable to say.

The table below was prepared from data obtained from the 840 replies to the questionnaire which the Aberthaw company sent out regarding housing and labor turnover. It indicates that over 50 per cent of plants reporting turnover which have adequate housing around them have a turnover below 50 per cent, while only one-third of the plants where housing is insufficient report as low a turnover as this.

RELATION BETWEEN LABOR TURNOVER AND HOUSING		
Turnover	Percentage of localities reporting adequate housing	Percentage of localities reporting insufficient housing
Less than 50 per cent..	52.5	34
50 to 100, per cent.....	21	35
100 to 200 per cent.....	14	14
200 to 300 per cent.....	7	6
300 to 400 per cent.....	3.5	8
Over 400 per cent.....	2	3

### The Financial Side of the Housing Problem

The financial side of the housing problem presents the greatest obstacle from the points of view of both the employee and employer. In most cases where workers own

their homes the payments which they have to meet are too great and they find it hard to keep them up.

To the employer, the building of suitable houses for his employees means the investment of a large amount of capital on which there can be no direct return. Furthermore, when the employer goes into the real estate business he complicates his relations with his employees.

There are several factors which must be considered in dealing with the problem if satisfactory results are to be obtained. They are:

- 1—The building of permanent fireproof houses.
- 2—The designing of the houses so that they are attractive and suited to the tenant's needs.
- 3—Easy payments.
- 4—The establishment of a definite financial policy.
- 5—The elimination of profit to the employer in selling.
- 6—Reducing the amount of the employer's capital tied up by selling part of property in open market.

### What the Norton Companies Have Done

The efforts of the Norton Companies in Worcester in the development of employees' homes at Indian Hill were described by Clifford Anderson, who pointed out that the plan of financing which the companies have adopted calls for the making of two notes by the employee-purchaser, one a time note running for 12 years, and the other a demand note. A preliminary payment of 10 per cent is obtained and the notes are secured by mortgage on the property.

Besides this, the employee is compelled to take stock in a co-operative bank in a sufficient amount so that at the end of 12 years the time note is automatically paid off. After that the employee can easily get a city bank to carry the amount of the demand note as a mortgage. The average amount paid per month by purchasers is \$25.

The results of the work in connection with the Indian Hill development have been most beneficial when considered from the viewpoint of labor turnover.

## Demmler Worm Drive Transmission for Farm Tractors

A SLIDING gear transmission combined with a worm drive for farm tractors is being manufactured by the Demmler Mfg. Co., Detroit, Mich., under patents Nos. 1,040,649 and 1,249,347 issued to J. Demmler. It will be seen that the transmission housing is combined with the housing for the worm gear on the rear axle, thus making the transmission and the final drive a single unit. Tapered roller bearings are used on all shafts, making it unnecessary to provide special bearings for the end thrust. The reduction ratio of the worm gear set is  $14\frac{1}{2}$  to 1, and in plowing, all of the gears in the

transmission are idle. The low speed ratio is exactly three-fourths of the plowing speed ratio.

The pulley-shaft is driven through helical gearing from the main shaft of the transmission, and while the tractor is delivering power to the belt, no transmission gears are in mesh. The speed of the belt pulley-shaft is the same as that of the main transmission shaft.

### License Engine Development

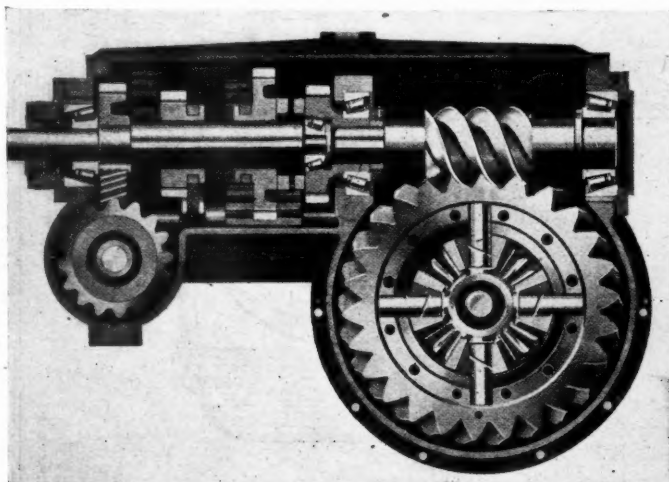
The degree to which all engineering work is being regulated by the government in England is well illustrated by a recent order of the Ministry of Munitions which gives the authorities control of all experiments looking toward the development of new aircraft engines.

The order provides that on and after May 15th no person may begin or proceed with the experimental construction of any aero-engine without a license from the Minister of Munitions, for which written application must be made.

The applicant must give full particulars of the construction for which the license is required and such further information as the director general may require, and must comply with any restrictions or conditions that he may impose.

For the purpose of the order "the term experimental construction means any construction which is not under or for the direct purpose of fulfilling a government contract, and shall include the preparation of any working drawings, but not the preparation of general arrangement drawings."

Where a first application for a license under the order has been made and is pending for the carrying on of any experimental construction begun before May 15th, such construction may be carried on until the license has been refused.

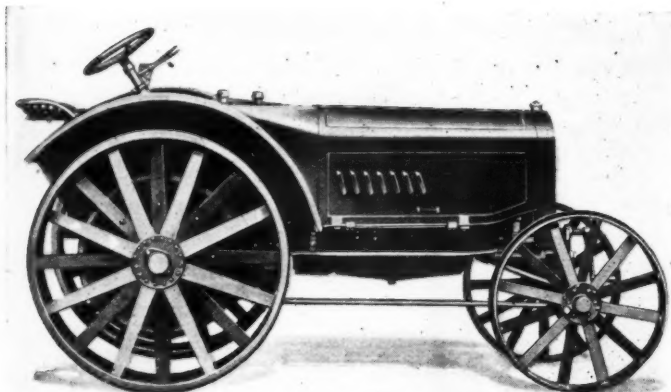


Demmler tractor transmission and worm drive

# Emerson-Brantingham Model AA Tractor

A Three to Four-Plow Machine with Inclosed Internal-Gear Drive and an Interesting Combination of Transmission and Rear Axle

By P. M. Heldt



*Emerson-Brantingham 12-20-hp. tractor*

A NEW tractor model with a 12-20-hp. S. A. E. rating has been announced by the Emerson-Brantingham Co., Minneapolis. Generally speaking, the machine is of the automobile type, having a four-cylinder engine arranged longitudinally in front under a bonnet, a cone clutch, a sliding change speed gear, bevel gear transmission to a jackshaft and transmission by pinion and internal gear from the jackshaft to the rear wheels. Kerosene is used as the fuel in regular operation, but starting is effected on gasoline. The tractor is rated to draw either three or four 14-in. plows, and has a net weight of 4355 lb., while the shipping weight amounts to 4735 lb.

The four-cylinder engine, which is a typical tractor type, is set somewhat further to the rear than is customary and is well balanced between the front and rear axles, so that it is protected against shocks. This arrangement of the engine also helps to shorten the wheelbase and therefore to reduce the turning radius.

The cylinders are of the L-head type, of 4 1/4 in. bore by 5-in. stroke. They are cast in pairs, each pair having its cylinder heads integral. The normal speed is 900 r.p.m. and the engine is maintained at this speed by a centrifugal governor of which a sectional view is shown herewith. The piston displacement of the engine is 354.4 cu. in.

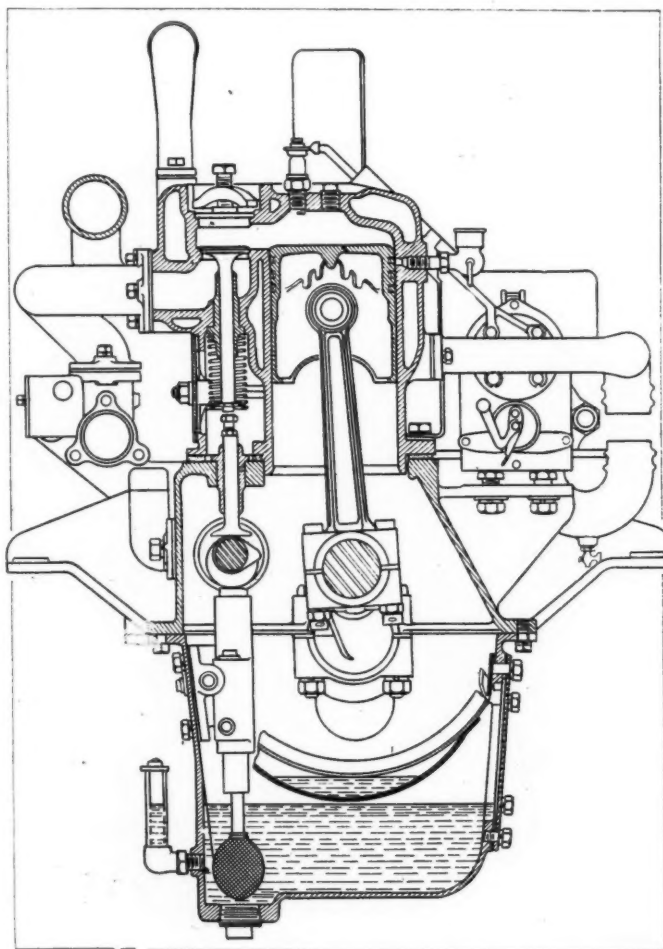
Both valves have a clear diameter of 1 1/4 in. The openings over the valves are closed by plates, which are held in place by means of yokes and set screws. This makes the valves more readily accessible than where screw plugs are used.

The pistons are of cast iron and are provided with three rings above the wrist pins, with diagonal cuts. It will be seen from the sectional view of the piston that the head is well ribbed, the object being to insure a ready transfer of heat from the head to the skirt. There is a narrow relief at the wrist pin zone, and there are three oil grooves on the skirt below the wrist pin. The lower part of the piston is cut out at the sides where there is no bearing pressure.

The hollow wrist pin is fastened in one of the piston bosses by means of a pin screw which in turn is secured by a lock washer and split pin. The connecting rods are I-section drop-

forings of medium carbon steel and are provided with bronze bushings at the upper end. Connecting-rod caps are held in place by four bolts each. The connecting-rod big ends are lined with babbitt half bushings, and shims are used for adjustment. The crankshaft, which is of the usual drop forged type, is supported by three main bearings, all of which are 2 3/16 in. in diameter. The total length of the main bearings is 11 1/4 in., this length being divided between the bearings as follows: Front, 3 1/4 in.; center, 3 1/4 in.; rear, 4 1/4 in. The crankpin bearings are 2 3/16 in. in diameter by 3 1/4 in. in length.

All valves are located on the left hand side of the engine, looked at from the rear, the valve spring compartments having the usual cover plates. Cams are of the mushroom type and are forged integral with the camshaft, which is 1 1/4 in. in diameter, and is supported by three bearings. The two forward camshaft bearings are of such large diameter that the whole shaft can be withdrawn from the front end. The



*Cross section through engine*

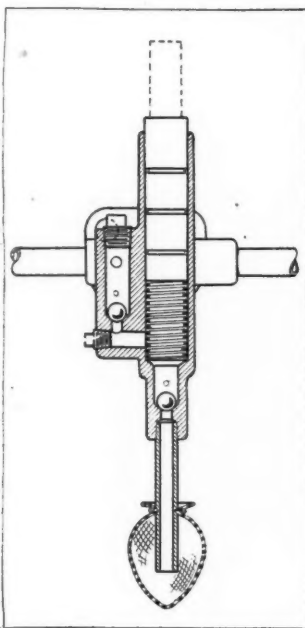


pushrods are set in guides secured into the wall of the crank chamber and are provided with adjusting screws.

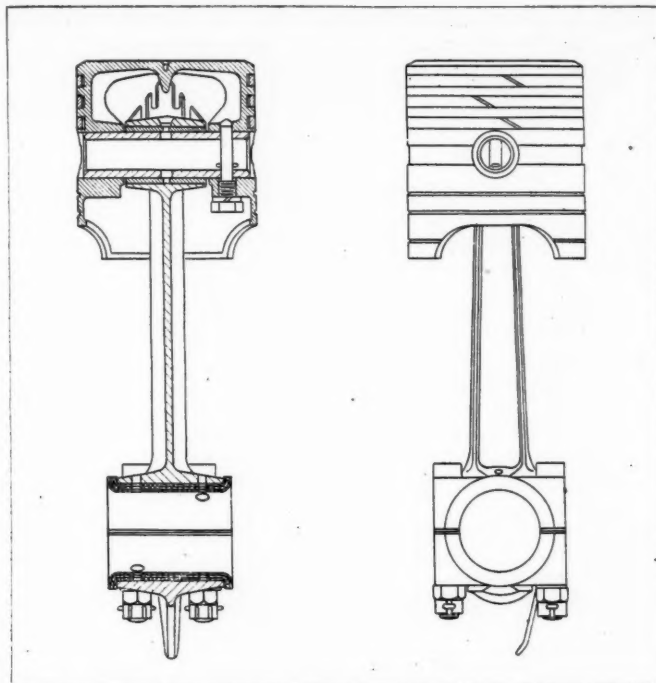
The crankcase, which is made in halves, of cast iron, is divided in a horizontal plane through the crankshaft axis. The upper half is cast with four supporting arms resting on the main frame. There are large hand holes in the lower half, through which the main and connecting-rod bearings can be adjusted. Heavy gaskets are used under the hand hole cover plates.

Lubrication is effected by means of a circulating splash system. A considerable amount of oil can be carried in the oil well or lower part of the crank chamber. There is an oil gage glass at the side of the crankcase from which the level of oil in the chamber can be seen at any time. The oil is circulated by means of a plunger pump of very simple construction, a detail drawing of which is shown herewith. Oil is drawn into the pump barrel through a bulb-shaped screen of brass gauze and through a ball check valve. The pump plunger is provided with a number of oil grooves and is actuated directly from the camshaft through an eccentric, being returned by a coiled spring inside the barrel. It delivers the oil through another ball check valve into a horizontal distributing pipe running nearly the whole length of the engine.

The pump barrel is cast with a bracket by means of which it is bolted inside the lower half of the crankcase. Directly below the pump inlet there is a drain plug.



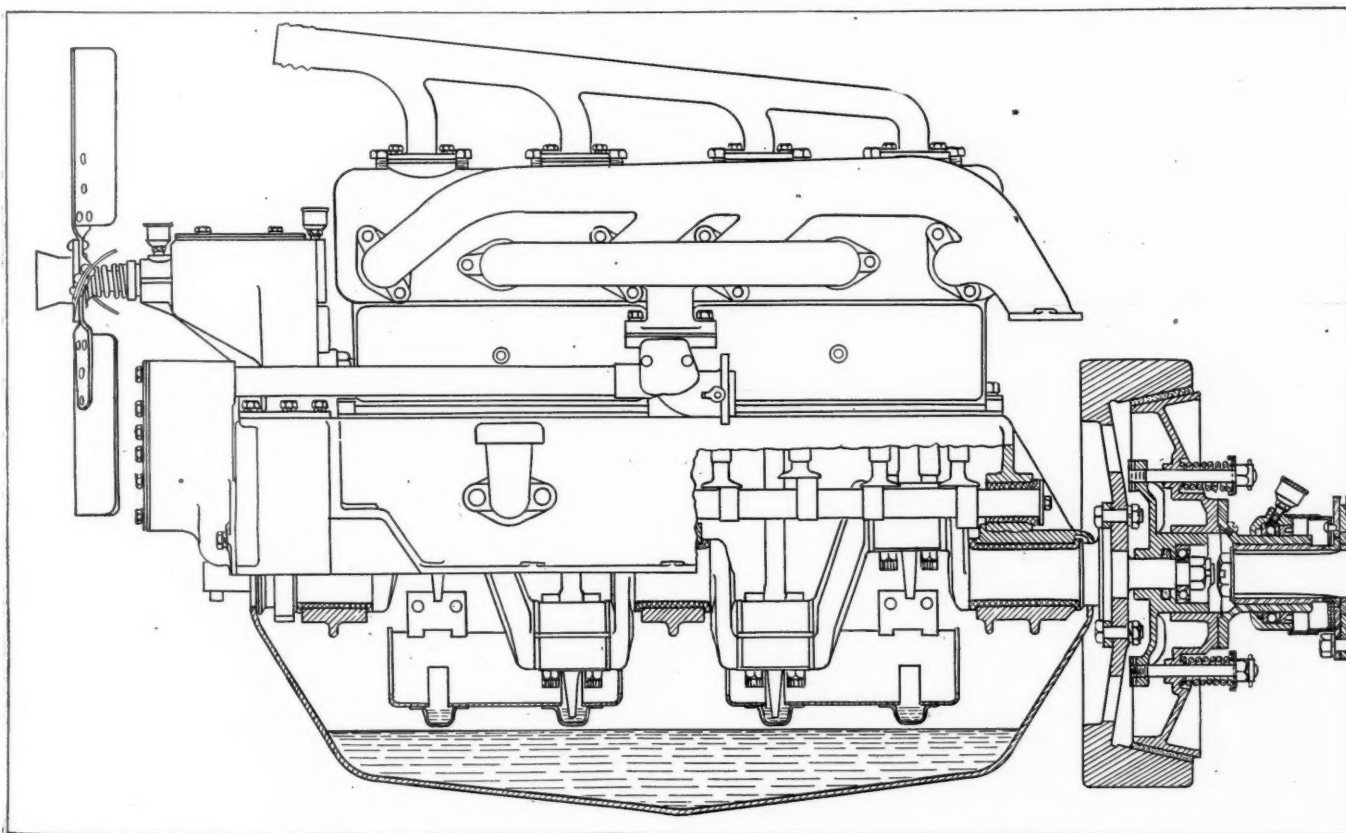
*Plunger type oil pump*



*Detail views of piston and connecting-rod*

Each connecting-rod head is provided with a dipper or oil splasher, and under each of these splashers there is a trough of circular form.

The splash troughs are arranged in an unusual way. There are two of these troughs, one for each pair of cylinders, of sufficient width to take in the two connecting-rod heads. Directly underneath each connecting-rod splasher there is a depression in the trough through which the splasher sweeps. The object of these depressions is to prevent one rod going dry when the tractor ascends or descends a grade, as the

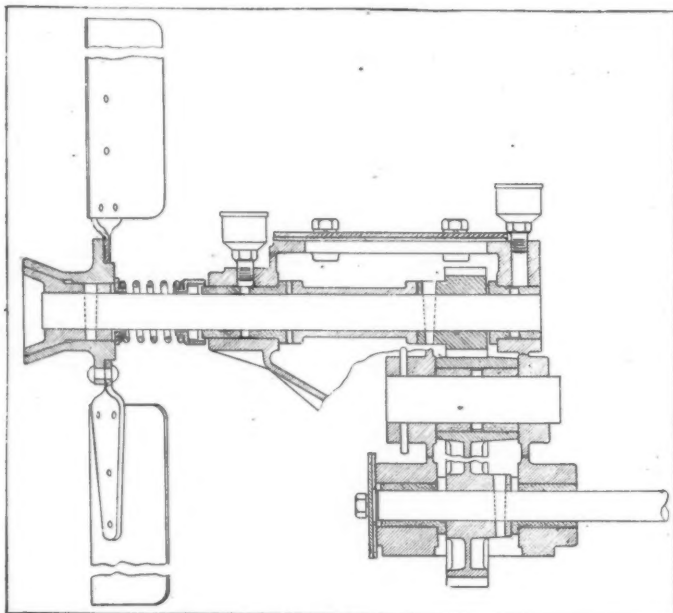


*Side elevation of engine, partly in section, and section of clutch*

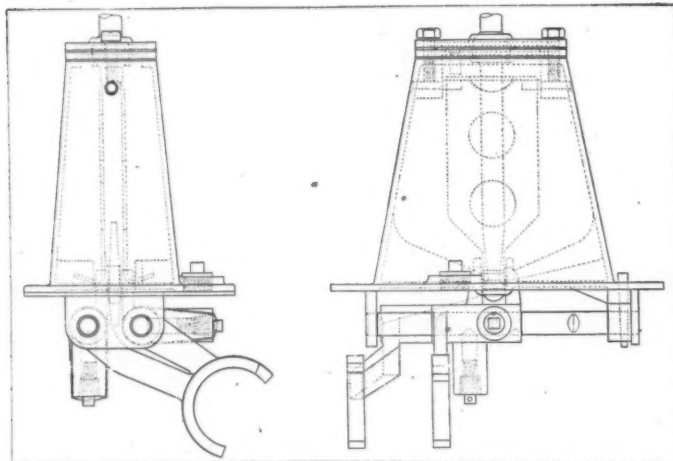
depression will retain lubricant. The troughs are made of sheet steel, of the form shown in the illustration, and are secured by hinge pins to pads bolted to the wall of the crankcase lower half. These troughs swing down when the connecting-rod bearings are to be taken up. Sheet steel gutters are placed on the inside wall of the crankcase to catch oil draining back and lead it into the depressions in the troughs.

A Bennett 1½-in. kerosene carbureter is used. There is one fuel tank with two compartments which will hold 20 gal. of kerosene and 4 gal. of gasoline. Water injection is used in connection with the kerosene. The air is drawn through a Bennett centrifugal air cleaner. The fuel tank is located under the cowl directly back of the engine space and fuel is fed to the carbureter by gravity. The two filling openings of the tank project through the cowl.

Water is used as a cooling fluid and is circulated through a Modine Spirex cellular radiator by means of a centrifugal pump. A sectional view of the pump is shown herewith. The pump is driven at crankshaft speed (900 r.p.m.). The total capacity of the cooling system is 7 gal. Behind the radiator is mounted a four-blade gear-driven fan 20 in. in diameter. In order to prevent injury to the fan by sudden changes in engine speed, a friction clutch is provided in the drive. The hub of the four-bladed fan is bored out conically at its forward end and is pressed against a male cone pinned to the fan driving shaft by means of a coiled spring surrounding the shaft. Grease cups serve to lubricate the bearings of the fan shaft.



*Positive fan drive with safety friction clutch*



*Arrangement of selective gear controls*

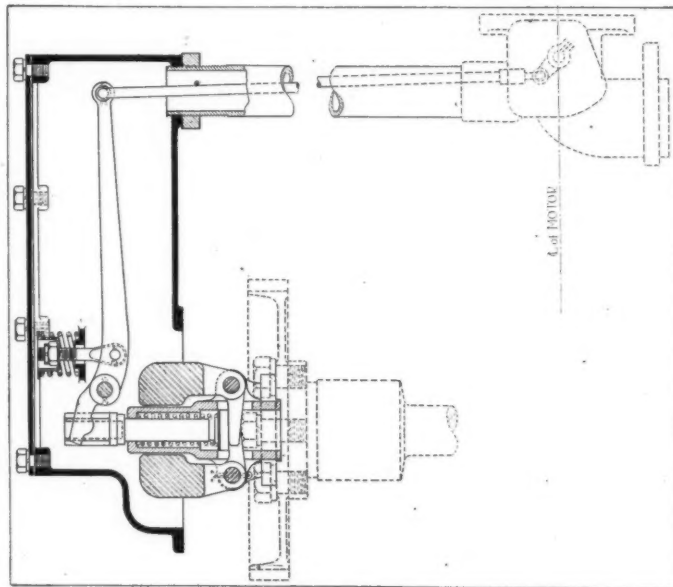
Ignition is by K-W high-tension magneto, and the spark plugs have a ½-in. pipe thread. As will be seen from a sectional view of the engine, these are screwed into the cylinder head.

The governor is carried at the forward end of the camshaft, the two flyballs being arranged in the form of bell cranks the inwardly directed arms of which act on a collar on a plunger. This plunger acts upon a double armed lever which connects by a link to the throttle valve. All of the governor mechanism is fully inclosed, including the adjusting device, which can be reached by removing the cover plate of the governor housing. The governor acts on a throttle valve separate from the carbureter throttle.

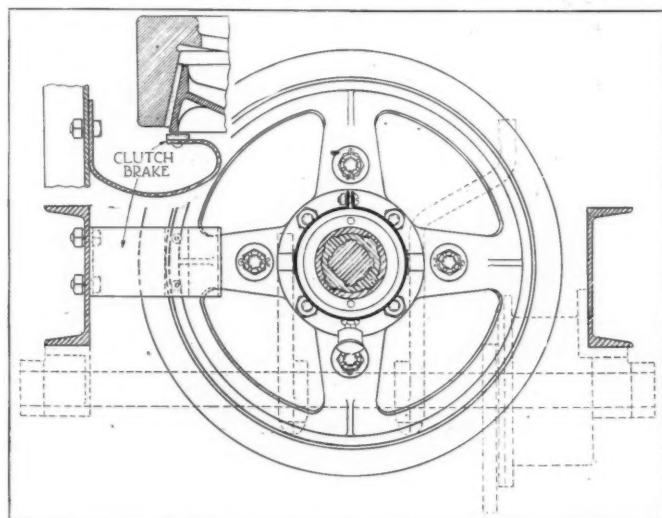
The engine complete with flywheel weighs 1000 lb.

The clutch is of the cone type with asbestos fabric facing. It is supported on a cup and cone ball bearing on the clutch pilot, and there is also a ball bearing throw-out collar. In order to prevent oil and grease getting into the clutch and onto the asbestos lining, a packing is provided in the pilot hub. There are four clutch springs on studs screwed into the pressure plate, and clutch adjustment can be readily made. A clutch brake is provided which consists merely of a spring steel plate bolted to one frame bar and having its free end faced with asbestos fabric, against which the rear edge of the clutch cone bears when the clutch is withdrawn.

An unusual feature of the tractor is that the transmission casing and rear axle housing are formed in a single casting. The main shaft of the transmission extends forward and

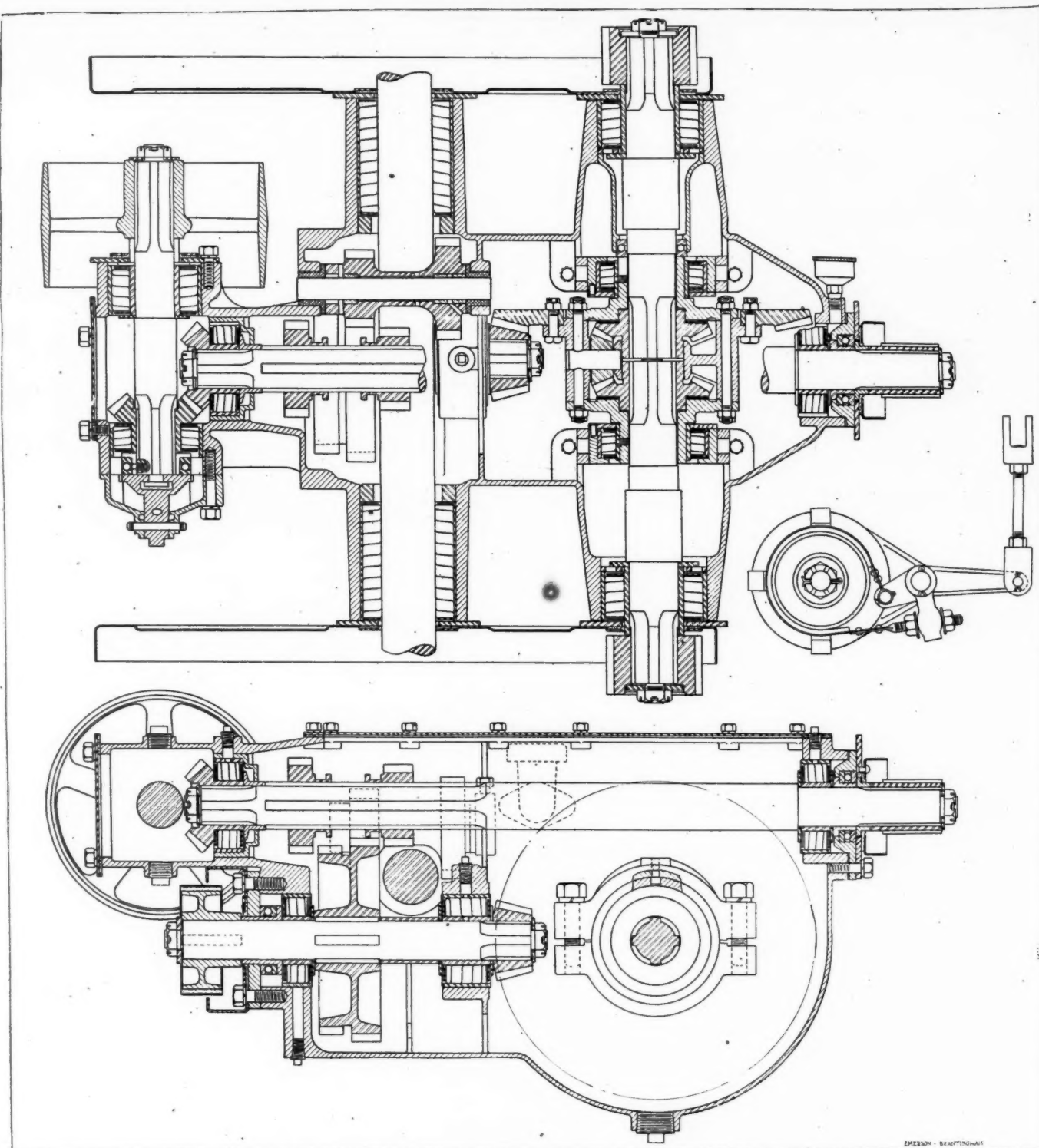


*Engine governor*



*Rear view of clutch, with detail of clutch brake*





*Horizontal and vertical sections through transmission and drive*

directly over the rear axle shaft. It is fluted at its rear end and carries two sliding pinions, each of which may be meshed with one member of the double gear ring, whereby the two forward speeds are obtained. There is also a pair of intermediate pinions for the reverse. The double gear ring is keyed to the secondary shaft which is located underneath the rear axle shaft. Reference to the vertical section of the transmission will show the short distance between the supports of the secondary shaft and the consequent rigid mounting. At its rear end, outside of the gear housing, this shaft carries a small diameter brake drum and at its forward end it carries a bevel pinion which meshes with a bevel wheel on a cross shaft. On this cross shaft is located the differential gear, which is of the bevel type. At the end of this cross shaft are mounted the bull pinions, which are secured in

place by means of splined fittings. All bearings in the transmission and rear axle, with the exception of those in the reverse idlers, are of the Hyatt flexible roller type. The slight amount of end thrust on the secondary shaft of the transmission, due to the bevel gear tooth reaction, is taken up by a ball thrust bearing. Packings are provided where shafts enter or leave the transmission box, so as to reduce the loss of lubricant to an absolute minimum.

The two reverse pinions are in a single piece and run on a stationary stud, being provided with bronze bushings at both ends. These are clearly shown in the horizontal section through the transmission.

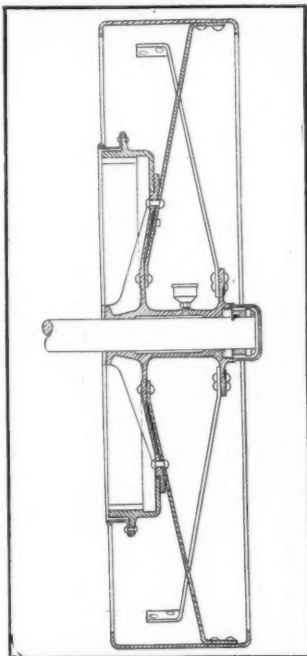
Operation of the change gear is effected on the selective principle through a ball mounted lever directly on the transmission box. There are two slides and one or the other of

these can be picked up at will. The slides are held in the neutral and full mesh positions by spring-pressed locking dogs of which one is arranged horizontally and the other vertically (see cut).

A feature of considerable importance is that all transmission and rear axle bearings are in a single casting, so that disalignment of bearings in service is a practical impossibility. There is a large opening in the top of the transmission case and a smaller one in the rear of the case. Both of these are closed by steel plate covers.

The brake drum at the rear end of the transmission countershaft is only 5 in. in diameter and 2 in. wide. An asbestos-lined band can be contracted upon it by means of a bell crank mechanism connected to a clutch pedal which insures equal effectiveness for both forward and backward motion.

The two forward speeds are 1.81 and 2.33 m.p.h. respectively. The high gear driven ratio between the engine and the rear wheels is 61.5:1 and the low gear drive ratio 79.5:1. The diameter of the transmission primary shaft is 2 in. and the diameter of the secondary shaft the same. The differential shaft has a diameter of 2 $\frac{3}{8}$  in. There is a total of

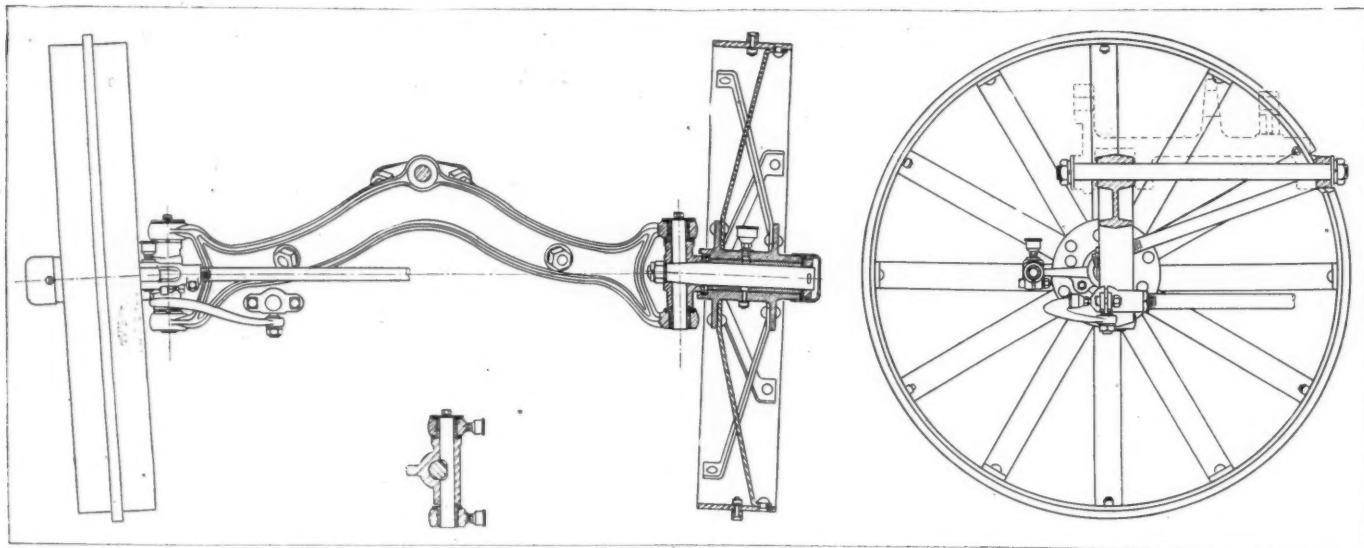


Section through driver

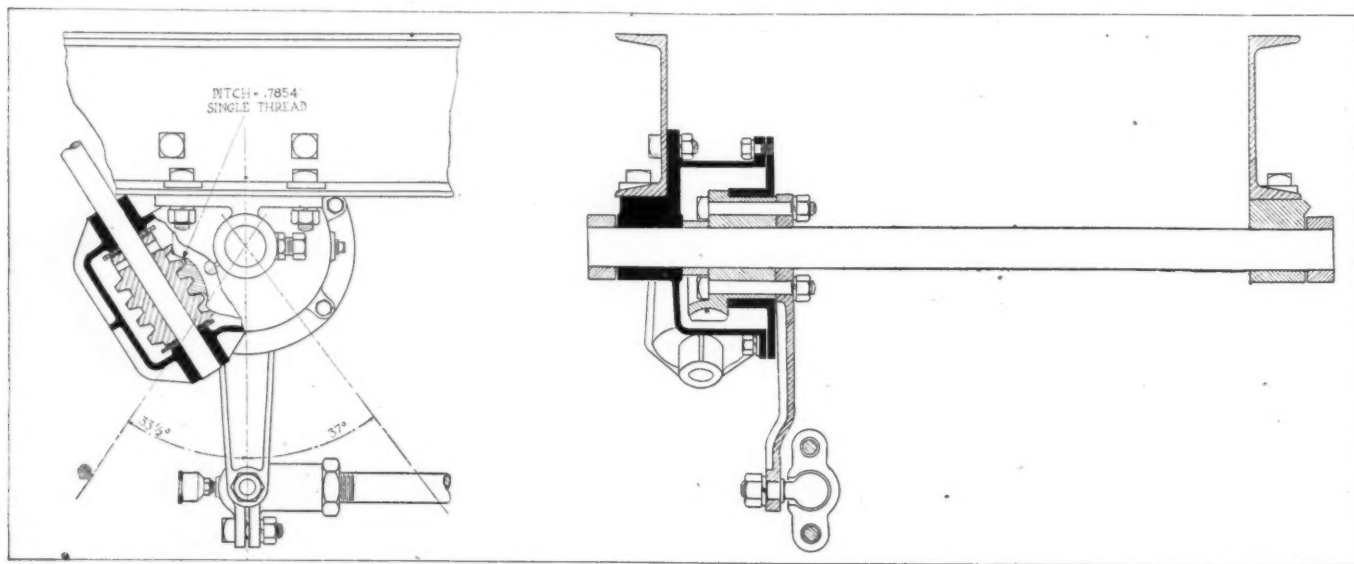
twelve roller bearings in the rear axle and transmission. The transmission gears are made of steel, cut and hardened. The rear axle, as will be seen from the illustration herewith, is of the live type, and its shaft has a diameter of 2 $\frac{3}{4}$  in.

The belt pulley is located at the rear of the tractor on a cross shaft, which is driven from the main shaft of the transmission through a pair of miter gears. End thrust due to these miter gears on both shafts is taken up on ball thrust bearings. The belt pulley is 12 in. in diameter, has a width of face of 6 $\frac{3}{8}$  in. and runs at motor speed, that is, 900 r.p.m. The miter gear on the thresher shaft can be shifted out of mesh when not in use. The final drive is inclosed by a sheet metal housing, as may be seen from the illustration of the transmission and rear axle.

The rear axle is a live axle, although the power is transmitted direct to the drivers by means of pinions and internal gears. The wheels are free upon the axle, but since the axle is mounted in roller bearings there is naturally less resistance to the rotation of the axle in its housing than to the rotation of the wheels upon the axle, and the wheels will turn upon the axle only in turning corners.



Front axle, front wheels and details of joint between front axle and frame



Steering gear and method of supporting it from both frame bars



A moderately light type of drive wheel is used. It has an inwardly flanged rim of  $\frac{1}{4}$  in. rolled steel, a cast steel hub and sixteen flat spokes riveted to the rim and to flanges cast on the hub. The internal gear ring is bolted to a shoulder on the large hub flange by means of S. A. E. cap bolts with castellated nuts. The right hand wheel is provided with a grease cup and presumably all the motion between wheel and axle required by the differential action takes place in the hub of this wheel. Attention may be called to that part of the internal gear housing riveted to a flange on the gear ring. This part has a beaded edge and is telescoped by the part secured to the transmission and axle housing. The rear wheels are 54 in. in diameter and have a width of face of 12 in. The wheelbase is 87 in., the thread measured to outside of wheel rims  $52\frac{1}{2}$  in., and the ground clearance at the drawbar, from 10 to 14 in.

The front axle is an I-section steel casting with a prominent upward arch, and has the forward end of the frame swiveled to it at the middle. Diagonal radius rods serve to steady the axle. The knuckles are of the Elliott type and are built up, the axle spindles being fitted into the knuckle castings by means of a taper, nut and cotter pin. In order to prevent interference between the axle spindle and the knuckle pin the axis of the former is set somewhat forward of the latter; but the knuckle pin is notched and the axle spindle passes below its surface and locks it in position. Grease cups serve to lubricate the bronzed bushed bearings of the knuckle pin in the steering head.

#### Steering Gear Well Supported

The steering gear is of the automobile type, the reducing mechanism comprising a worm and worm wheel sector. This gear embodies some interesting features of design. The steering arm, which is of channel section, is formed with a flat or narrow hub by which it is bolted to the worm gear sector. A flange cast on the steering gear housing serves to bolt the housing to the frame bar. In order to stiffen the steering support a  $1\frac{1}{2}$ -in. shaft is passed through the hubs of the worm wheel sector and steering arm and is extended through a bearing on the opposite frame bar. It will be seen that the worm gear sector has really a double support, in the bored-out hub formed on the gear housing cover plate, and on the shaft extending across the frame. Owing to the considerable distance between the two bearings supporting the cross shaft, any slight wear in them will not make the steering arm perceptibly shaky. The worm is secured to the steering shaft by a taper pin, and thrust washers are provided at both ends of the worm.

The frame is made of 6 x 2 x  $\frac{3}{16}$  in. channel steel.

The front wheel hubs are bushed, and thrust washers are provided at both ends. The steering tie rod extends in front of the axle and has the usual forked connections, while the drag line is provided with ball and socket connectors, the socket being made in halves which are bolted together. There is considerable camber to the front axle, something like  $5\frac{1}{2}$  deg., the object evidently being to confine the end thrust as much as possible to the inner end of the hub. The front wheels are 36 in. in diameter and have a 6-in. face. They are provided with a central skid ring secured to the rim by plow bolts, square nuts and spring washers. The illustration of the front axle shows details of the swivel connection to the frame.

#### Roller Chain Standardization Held in Abeyance

OWING to the fact that it is not considered advisable to disturb the existing order of things in the industries during the period of the war, the standards committees of the American Society of Mechanical Engineers and of the Society of Automotive Engineers, in joint session, adopted a resolution recommending not to adopt any new pitches, roller diameters, or widths of chains for roller chains during this period. This action has the approval of the following chain manufacturers: Baldwin Chain & Mfg. Co., Worcester, Mass.; Culver-Taylor Chain Works, Detroit, Mich.; Diamond Chain & Mfg. Co., Indianapolis, Ind.; Duckworth Chain & Mfg.



*E.-B. tractor at work in the field*

Co., Springfield, Mass.; Link Belt Co., Indianapolis, Ind.; Whitney Mfg. Co., Hartford, Conn.

The resolution also covers a number of other points, including the following: That it is highly desirable to reduce the number of chain models in general use to the fewest possible number, and to select from those now made a series of sizes to be known as Manufacturers' Standards, which will be designated by special numbers to be used by all manufacturers; that the series of pitches to be supplied shall be  $\frac{1}{2}$  in.,  $\frac{5}{8}$  in.,  $\frac{3}{4}$  in., 1 in.,  $1\frac{1}{4}$  in.,  $1\frac{1}{2}$  in.,  $1\frac{3}{4}$  in., 2 in.,  $2\frac{1}{2}$  in.; that the roller diameters are to be those most nearly approaching five-eighths of the pitch; that the widths are to be those most nearly approaching five-eighths of the pitch; that the trade number of these universal chains be such as to indicate the number of quarter inches in the pitch; that while models now cataloged will not be discontinued, these models will be recommended to the trade as the best proportioned chains for general use, and as those most likely to be kept in stock and most easily supplied in an emergency; that the bottom diameter of sprockets should never be oversize, and chain lengths should never be undersize; that the proper definition of "chain width" is the exact distance between the inside plates, and not the actual length of the roller, hence sprockets should always be made sufficiently narrow to allow the proper clearance for chains made in accordance with this definition.

The following names are recommended for parts of roller chains:

*Pin*—instead of "rivet" or "stud."

*Bushing*—the part in which the pin turns.

*Roller*—the part which turns over the bushing.

*Side-plate*—instead of "inside link" or "bushing sidebar."

*Pin-link-plate*—instead of "outside link" or "rivet sidebar."

*Roller-link*—instead of "center block."

*Pin-link*—consisting of one pin-link-plate assembled with two pins.

*Connecting-link-plate*—the detachable pin-link belonging to a connecting link.

*Connecting-link*—consisting of a pin-link and a connecting-link-plate assembled complete.

*Offset-link*—instead of "cranked link," consisting of two offset side-plates assembled with a bushing and a roller at one end, and an offset link pin at the other.

# The Albatross Fighting Biplane—IV

THE Albatross biplane belongs to the C class; that is to say, it is a general utility machine variously used for fighting, reconnaissance, artillery spotting and photography, and is therefore not to be considered a bombing machine. It is, however, provided with racks for four bombs for use when a suitable target presents itself. Fig. 17 is a diagrammatic perspective view of the bomb racks and bomb release gear. The bombs are secured underneath the main tank in the pilot's cockpit, but they are released by the gunner in the rear cockpit by means of a small lever and quadrant shown in the upper right-hand corner of Fig. 17.

The bomb racks are in the form of sheet steel supports, against the bottom of which rest the nose and the tail of the bombs respectively. These brackets are secured to transverse members in the bottom of the fuselage, which have been omitted in the drawing for the sake of clearness. The bombs themselves are supported by a steel strap passing underneath the bombs. At one end the straps are hinged, while at the other they are provided with an eye, which is secured in the hook under the release trigger. The sketch in the upper left-hand corner of Fig. 17 shows in more detail the hook in which the eye of the strap rests, and the trigger by means of which the strap is released. The trigger is pivoted near its center, and has an upward projection to which is attached a small coil spring resting in a groove in the base supporting the hook. When the cam on the transverse shaft presses

down the rear end of the trigger, the front end moves upward against the tension of the coil spring mentioned above, thus releasing the strap and with it the bomb.

As regards the cams which operate the bombs, these are mounted on a transverse shaft running across the bottom of the fuselage. There are four cams, each operating its trigger, but the gearing of the camshaft is such that it requires five pulls on the lever in the gunner's cockpit to rotate the shaft through a complete revolution. One of these pulls on the lever has no corresponding cam on the shaft, and has, it appears, been incorporated in order to provide an equivalent of a safety catch. When all the bombs are in place the first pull on the lever does not release a bomb, but merely brings the cam for bomb No. 1 into position, ready to press, on the next pull of the lever, the trigger for the first bomb. This has evidently been done as a precaution against accidentally releasing a bomb until the machine is approaching an objective.

We now come to consider the method of operating the transverse camshaft. Near the right-hand side of the fuselage there is mounted on the camshaft a small ratchet having five teeth as shown in the bottom left-hand corner of Fig. 17. On this ratchet is a small cam roughly of cone shape. This cam engages with grooves in the pulley around which passes the operating cable. A small leaf spring engages at the proper moment with the notches in the ratchet

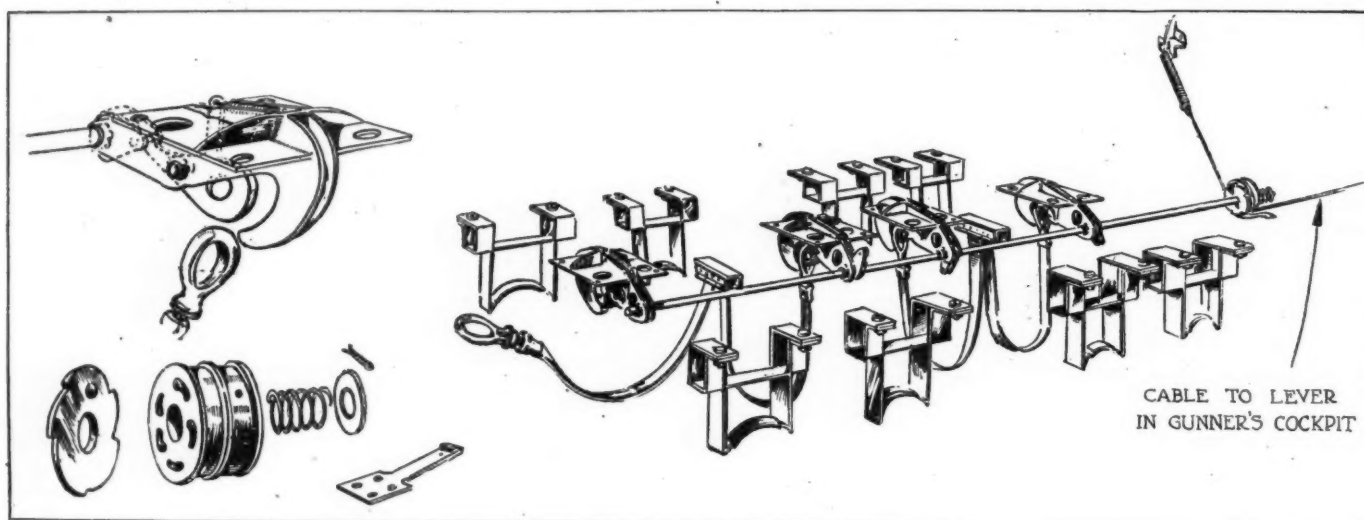


Fig. 17—Details of bomb dropping gear

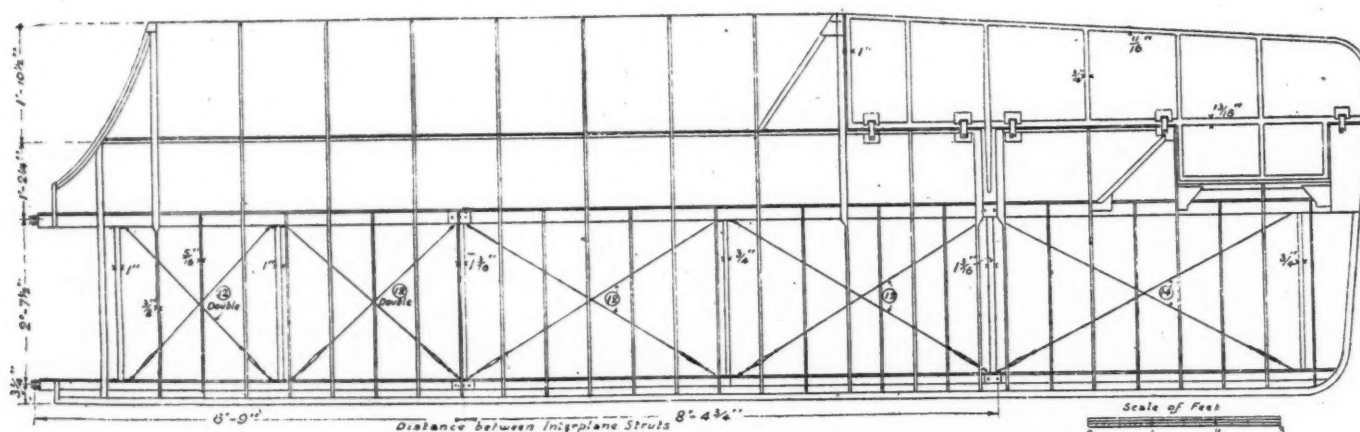


Fig. 18—General arrangement of upper left-hand wing (to scale)



and prevents the shaft from rotating in the reverse direction. One end of the operating cable is attached to a coil spring secured to the side of the fuselage, and passes from there around the pulley to the lever in the gunner's cockpit. Assuming that the first cam is in position ready to release its bomb, a backward pull of the lever rotates the pulley and with it the ratchet and camshaft, thus pressing down the trigger of one of the bomb racks and releasing a bomb. When the gunner releases the lever this is pulled forward to its normal position by the spring on the side of the fuselage. The little leaf spring engaging with the ratchet prevents this and the shaft from following the pulley around in the opposite direction and the cam on the ratchet sliding up the sloping bottom of one of the five grooves in the face of the pulley forces the pulley away from the ratchet against the compression of a small coil spring shown in the sketch. By the time the lever has reached its forward position, the pulley has revolved to such an extent as to bring the cam on the ratchet into the next groove in the pulley, and when the lever is again pulled the whole action is repeated.

#### Wings of the Albatross

In addition to a bomb release lever, there is in the gunner's cockpit another lever, the function of which appears to have been to engage and disengage a clutch near the engine, by means of which a drum is operated carrying the aerial of the wireless. In the bottom of the gunner's cockpit, near the left-hand side, is an octagonal opening in the floor, in which the camera was mounted. The compass, so as to be visible from both cockpits, has apparently been mounted in a circular opening in the right-hand lower main plane.

We now come to deal with the wings of the Albatross. These are, generally speaking, of the construction favored by the Albatross designer; that is to say, the front spar is well forward close to the leading edge, and the rear spar is approximately half-way along the chord. In addition there is a third false spar, which is not, however, connected up to the body nor supported by any struts, and which cannot therefore be considered as taking any particularly important part of the load. It will, therefore, be realized that the rear main spar may at small angles of incidence, when the center of pressure moves backward, be called upon to support all or nearly all of the load. This has evidently been guarded against in the Albatross by making the rear spar of generous proportions. Both main spars are made of spruce, and are of the box type, consisting of two halves spindled out and glued together with a hardwood tongue running through both flanges. The ribs are of I-section, with spruce webs and ash flanges. Between the main spars false ribs are employed half way between the adjoining main ribs, so as to better preserve the curvature of the wing for this distance.

#### Internal Drift Wiring

The general arrangement of the upper left-hand wing is shown with dimensions in Fig. 18, from which the general layout of the wing will be clear. The internal drift wiring is in the form of five bays, the compression struts for this wiring being in the form of circular section steel tubes. In the two inner bays both drift and anti-drift wires are in duplicate and are approximately 12 S.W.G. The next two bays have single wiring, also of 12 S.W.G., while the outer bay has single wiring of 14 S.W.G.

The attachment for the compression tubes and the drift and anti-drift wires is shown in Fig. 19. A box of thin sheet steel surrounds the spar at this point and is bent over and bolted as shown in the small section in Fig. 19. On the inner face of the spar this sheet steel box has two wiring plates stamped out, which receive the drift and anti-drift wires. A short cylindrical distance piece is welded on to the box, and around this fits a short tubular sleeve held in position by a split pin. This sleeve forms a socket for the tubular compression strut.

Vertically the spar is pierced at this point by three holes, for the bolts securing the interplane strut and the two interplane cables. The attachment for the latter is shown at the bottom of Fig. 19. The base plate has machined in it two recessed circular openings which receive the two terminals for the cables. These terminals are prevented from rotating

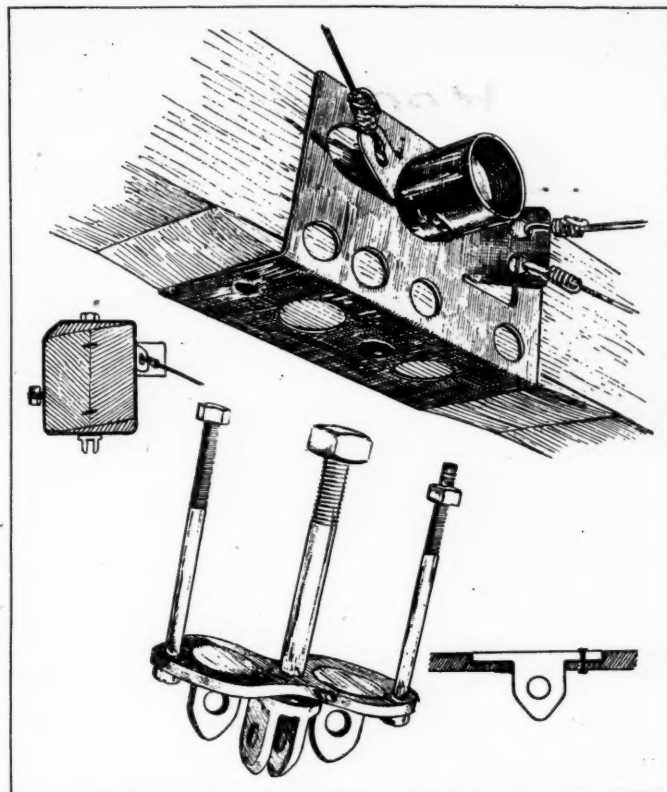


Fig. 19—Sheet steel spar box and socket for compression tube of upper plane. The bottom sketch shows the attachment of the terminals for the interplane cables and struts

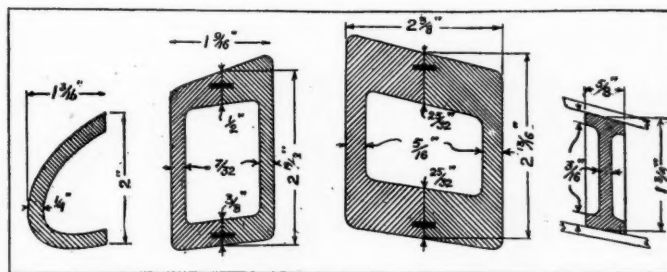


Fig. 20—Sections of spars and leading edge

by a small rivet as shown in the sectional view. In order to further strengthen the spar at the point where it is pierced by these three bolts, the spar is left solid for a short distance on each side of the box.

In Fig. 20 are shown sections, to scale, of the two main spars, the false spar, and the leading edge. The trailing edge is, as in the majority of German machines, in the form of a wire.

(To be continued)

#### Finishing Enamels and Lacquers

WE have received from the Moller & Schumann Co., Brooklyn, N. Y., a copy of a booklet on Military Enamels, Air Drying and Baking. Many manufacturers taking contracts from various of the Government departments find themselves at a loss as to just what materials will answer for finishing. No. 928 Gun Finish, described in the bulletin, is particularly desirable on any equipment subject to excessive heat, and which at the same time must have a finish which will not reflect light.

The "crystallized effect" is likewise suitable for equipment that must not reflect light. The "clear crystallizing lacquer" can be used over practically any color, which makes it adapted for many purposes.

Various special shades are shown which are at present being used by Government departments.

# Reo's Clubhouse for Workers

The Large Auditorium Furnished Entertainments for Reo Families All Winter—  
Employees Are Cultivating Gardens—Welfare Work  
of One Kind and Another

By C. J. Shower

THE clubhouse erected about a year ago by the Reo Motor Car Co., Lansing, Mich., has done a great deal to make the employees of the company contented with their work; it has been the means of welding together more closely employee and employer. Many of the employees have been known to say that they like to work for the Reo because "they treat the employees so well." Therein lies the secret of a small turnover. Employees must be made satisfied with their work in order that the turnover may be kept down.

Here in this building almost all forms of entertainment and recreation that appeal to the average worker are provided. The structure is two stories high and covers an area of about 100 x 50 ft. On the first floor is a large auditorium which will seat 1800 persons and is equipped with a great pipe organ. The chairs can be removed when necessary to make room for a dance. A gallery runs all around the room. On the opposite side of this auditorium, and to the right of the lobby, is a reading room. On the second floor are billiard and pool tables and twelve card tables.

In the basement, directly under the auditorium, is a cafeteria with long tables running crosswise, and stationary stools on both sides. This room will accommodate 700 diners at one time. The lower floor also provides four alleys for bowling.

Very few employees bring their luncheon with them, because of the good, tasty dishes served in the club dining room. As soon as the noon whistle blows at 11.45

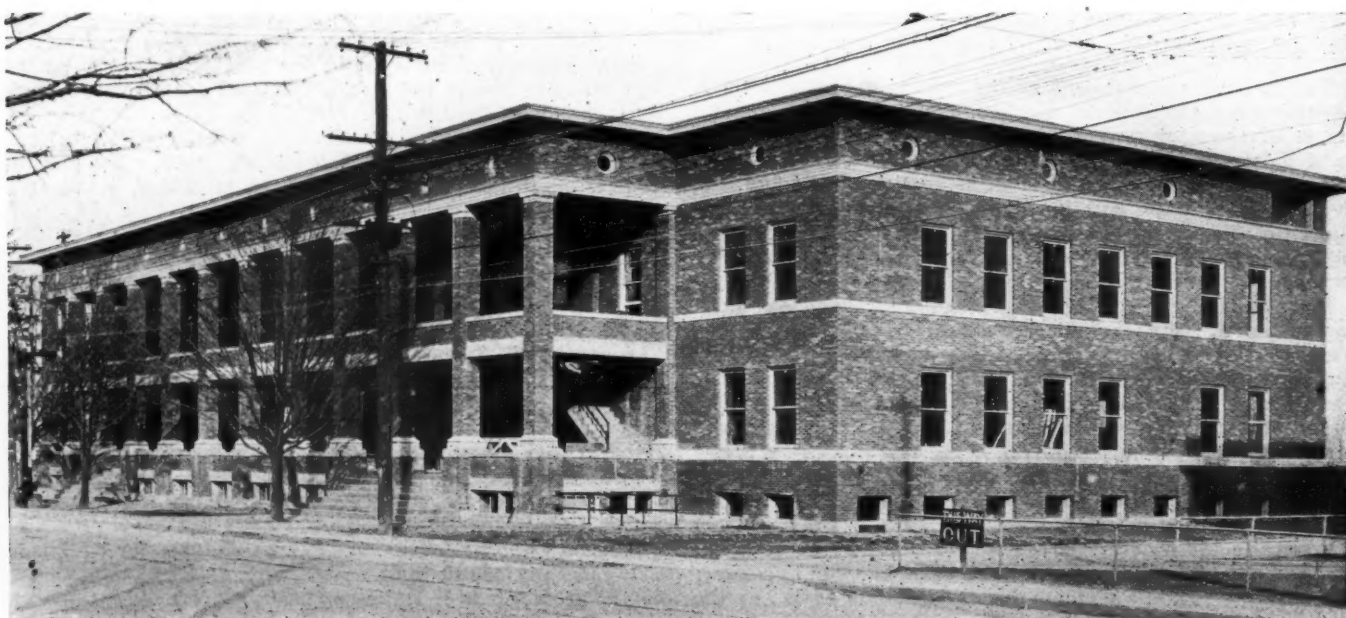
a. m., a mad rush is made from the factory toward the club. In a second a human chain connects the doors of the factory with those of the cafeteria. This is a daily sight.

The men pass into the dining room in two long rows. At the extreme end of the room are two serving tables. When they have received their portions of meat or fish, potatoes and vegetables, they find themselves vacant chairs at tables. Very moderate sums are charged for the meals. The one just described costs 15 cents; with a beverage or dessert an extra charge of 5 cents is made.

After lunch most of the workers still have half an hour or so at their disposal before going back to their tasks. This time they use for playing billiards, cards or checkers, or they settle back in large leather chairs to read or smoke. One corner, with a piano, has been set aside in the reading room for the girls.

During the winter the auditorium is kept alive with activities. Two or three times a month departments of the factory give dances. Every Wednesday and Saturday moving pictures are shown, with a matinee on Saturday for the wives and children of the employees. Only select features are exhibited at these times—Pathé news, comedies, Paramount and Metro pictures. They usually consist of six or seven reels. A special feature is obtained every second month.

Fortnightly the workers and their friends are treated to a concert by the Reo band, an organization of thirty-five, all Reo employees. In the summer time band con-



Exterior view of the Reo clubhouse





*Last fall the employees held a fair, to which they brought the best they had raised in their gardens. This picture shows a corner of the agricultural display*



*Upon entering the Reo clubhouse and turning to the right you come into this room. It is usually filled noons and evenings with readers and smokers*

certs are given in Morris Park. These concerts are free to the public. Frequently entertainment is provided by Reo talent.

For the benefit of dealers and visitors a 1500-ft. reel illustrating just how a Reo car is made is shown on the screen in the auditorium daily at 10 a. m. and 3 p. m. It takes 1¼ hr. to run this.

Admittance to any of the Reo programs is gained by ticket. At intervals of 2 or 3 months each employee is given a small ticket bearing his name and number. This paper admits him to all of the entertainments given by the Reo company.

#### Ground Donated for Gardens

On a plot of ground donated by R. H. Scott, vice-president and manager of the Reo Motor Car Co., the employees are cultivating vast gardens. The tract of ground is divided into forty-five lots 20 x 160 ft., each worked by an individual who was given the land by the company through the welfare department. Each of the gardeners was obliged to pay \$1 for the cost of plowing and harrowing the ground. Seeds were furnished without charge.

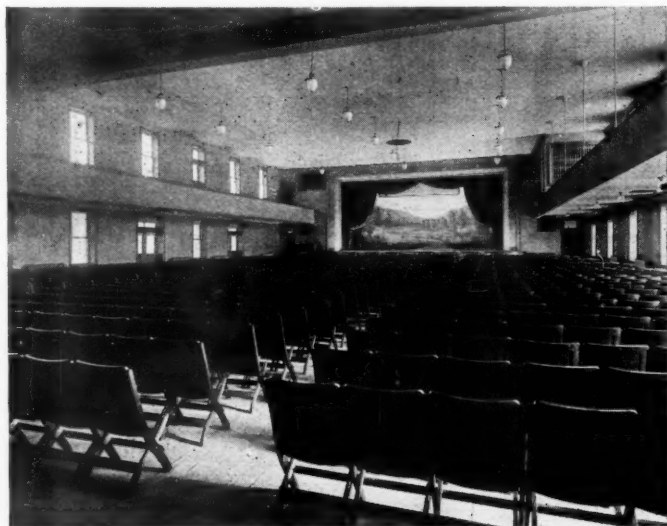
Last year sixty separate lots, to which number a few more were added later, were given the employees to cultivate. No charges were made then for preparing

the ground. Most of the men devoted their land to vegetables, few planting their entire strip to potatoes.

A very interesting fair was held in the fall of that year, and nearly all the employees brought the best they had raised in their gardens. Together with stock and fancy work made and brought in by the women, it proved a genuine fair. Prizes were donated by local merchants. The fair drew such a large crowd that the company hesitates to hold another fair this year, as there is no other more spacious place to hold it in.

Every year, in August, a grand picnic is held at the athletic field. It usually takes place on a Saturday, when the men lose only a half day's work. The wives of the employees pack the lunches and bring them to the grounds in baskets. Street car tickets are supplied each family by the company. A baseball game is usually played in the afternoon by the company's teams, and moving pictures are taken of all the important happenings and are later shown on the screen in the Reo auditorium.

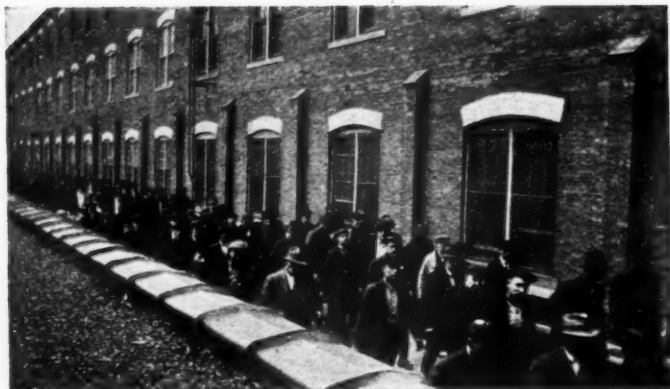
The Welfare Department, which has jurisdiction over the clubhouse, also engages in other worthy activities apart from those designed to provide pleasure. The health of the employees is looked after. After an employee is away from work 3 days a man from the Welfare Department calls at his home to ascertain why he is out, but



*Interior of the auditorium that will seat 1800 persons. When a dance is planned by one of the factory departments, these chairs are removed and the canvas covering taken up*



*View of the club dining room, where 700 factory employees can be fed at one time. Very tasty and substantial meals are served here at nominal costs—15 to 25 cents*



*Procession of Reo employees to the restaurant*



*Off for the Saturday afternoon ball game at the Reo park*

generally learns that sickness is the cause. In this event the investigator asks if the company can be of any assistance.

The employees maintain a benefit association which is quite helpful at times of illness. Members of the association get \$1 a day after the seventh day while they are ill. This continues until the amount of \$60 has been paid. Upon death the widow gets \$100. Should an employee's wife die, he is paid \$50, and the death of one of his children entitles the insured to \$25. These are not very large amounts, but they are helpful to the recipient when they come. Each week 10 cents is deducted from the employee's wages by the timekeeper, who is custodian of the funds. Although this association is distinctly apart from the activities of the Welfare Department, it is maintained through the latter's co-operation with the timekeeping office.

Another activity of the Welfare Department is adjustment work. The company endeavors to prevent any garnishments on its employees. Whenever a firm desires to collect a bill from one of the company's employees, the only and right way, according to the company, is, before taking garnishment proceedings, to take up the matter with the company's adjustment department. The man is sent for and questioned about his debts. After his salary is taken into account, and what rent he pays, it is determined what payments the employee can afford to pay on his debt. The idea back of this plan is to help the worker and not burden him. The plan has cut down monthly garnishments to a single one, where they formerly ran as high as a dozen a week.

#### **Merchants Recognize Welfare Department**

Merchants have come to recognize this department, and if they are unsuccessful in collecting the money from the man they at once take up the matter with the adjustment department of the company.

Oftentimes it has been found that the man apparently does not misuse his money, but somehow he never has enough to meet his bills. It often developed that the man's wife was not very economical or judicious in the expenditure of the money given her to run the house. In these cases the Welfare Department suggests that an expert housekeeper be sent to his home by the Associated Charities to talk things over with the wife and learn what methods she has been pursuing in her domestic work, and see whether or not better methods could be used. Frequently suggestions have been offered by the visiting housekeeper that effected great savings to the family pocketbook, and, naturally enough, this was welcomed by the employee, as it offered him a means of getting himself out of debt.

Through the *Reo Spirit*, a monthly magazine published

by the Welfare Department, real estate buyers and sellers are brought together. The magazine lists the property for the employee, using a key number instead of his name (this to prevent outside real estate agents from troubling the man). The prospective buyer makes himself known by appearing at the Welfare Department, where the property owner (or advertiser) is brought to him. This is as far as the Welfare Department goes with the matter; it is left for the two men concerned to either make or drop the deal.

Should an employee at any time find that his deed is not right he can ask for the services of an attorney, which will be rendered without cost to him. No charge is made an employee for assisting him in making out papers of sale. The company occasionally makes loans, not exceeding \$100, to employees who are in dire need of money because of illness or through other unavoidable circumstances. Employees can borrow money, however, to purchase property. A rate of 6 per cent is charged, and the employee pays back his loan when he can, in the form of deductions from his wage check.

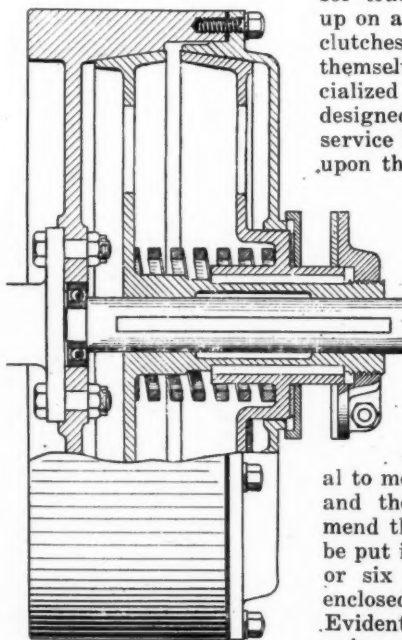
#### **The Stoufer Tractor Clutch**

WITH the great expansion of the tractor industry, signs are not wanting that the manufacture of component parts for tractors will soon be taken up on a serious basis. Engines, clutches and transmissions lend themselves particularly to specialized manufacture. A clutch designed especially for tractor service has been recently placed upon the market by the Stoufer

Mfg. Co., Minneapolis, Minn.

This clutch is of the double cone type, as illustrated here-with. An advantage of this type is that there is no end thrust, whether the clutch is engaged or disengaged. The clutch is of the metal

to metal type and runs in oil, and the manufacturers recommend that about one pint of oil be put into the clutch every four or six months. All parts are enclosed in a dust-proof housing. Evidently the disengaging mechanism must be of special design, operating between thrust surfaces on the hubs of the two cones, forcing them apart.



*Stoufer double cone clutch for tractor work*



# Aluminum Piston Development

Production of Small-Bore Engines Will Be a Factor—Improvements in Alloys Themselves Should Aid in Their Wider Use—Reduced Expansion Sought by New Mixtures with Closer Grain

By J. Edward Schipper

**A**LUMINUM piston difficulties have always resulted from the fact that the expansion of aluminum is about 50 per cent greater than that of cast iron for the temperature range encountered in engine work. In the light of experience during the past five years, when many manufacturers made sporadic attempts to use the material and then returned to cast iron, to be followed by others who took up the work and carried the aluminum piston along, we have had opportunity to learn a great many things. Now that the small-bore engine is coming into its own, it would be a matter of surprise if the aluminum piston did not return to favor.

When it is considered that the specific gravity of pure aluminum when cast is 2.59, while that of iron is about 7.21, and that of steel even higher, it is plain that in aluminum we have a material which offers great advantages for piston use.

Difficulties arise, however, out of the unusually high heat expansion of aluminum. The coefficient of expansion of aluminum is 0.000022 per degree centigrade; that of iron is 0.0000119 per degree centigrade. Since aluminum forms a very large percentage of all alloys used for the aluminum alloy pistons, their expansion is naturally not far from that of the pure cast metal, regardless of the alloy mixture.

The tabulations herewith give the results of some interesting experiments made on sample aluminum pistons. Sample A is a French aluminum alloy which is just being introduced into this country. Sample B is an alloy which is well known throughout the United States, being one of a secret mixture sold under a trade name which has had great popularity in this country during the past four or five years. It has been used on a number of racing cars, as well as on passenger cars. Sample C is gray cast iron of the quality usually used for piston work. From these tabulations it will be noted that the

expansion of aluminum alloys is fully 50 per cent more than that of cast iron. This must be allowed for in the clearances of the aluminum piston, and consequently piston slap is sure to ensue unless great precautions are taken.

In small-bore engines the total expansion is not so great, and this, together with the further experience in the manufacture of pistons gained during the past few years, is bringing the aluminum piston back into prominence. It has always been believed that the aluminum piston had a successful future in store for it, and, in spite of the many failures, some due to poor workmanship and some to the use of these pistons in engines not well adapted for them, there is still no reason to change this belief.

## Wall Sections Must Not Be Too Thin

One of the main points to remember in connection with the design of aluminum pistons is that wall sections must not be made too thin. The heat conductivity of aluminum is three times that of iron. With a thick piston wall, or one which from cast-iron piston practice would be considered thick, the heat can be carried off from the center of the aluminum piston head so rapidly that the head troubles experienced in the earlier aluminum piston engines are eliminated. The use of the thick skirt is not only beneficial as regards heat conduction, but also in that it reduces piston slap and lends itself to better results in the foundry.

There is still a great amount of research work to be done in regard to the alloy itself. We have not yet found the ideal alloy, though what we have is really remarkably good. The variety possible in aluminum alloys is practically infinite. There are a great number of alloying elements and a wide range of percentages in which they can be employed.

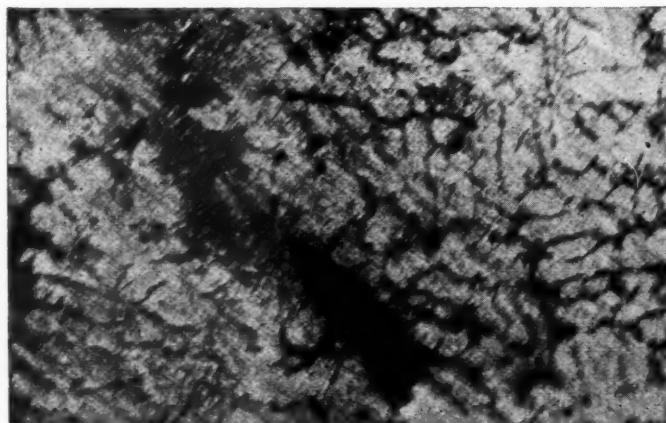


Fig. 1—Micro-photograph enlarged 350 diameters, showing the structure of one of the well-known aluminum-copper alloys used for pistons

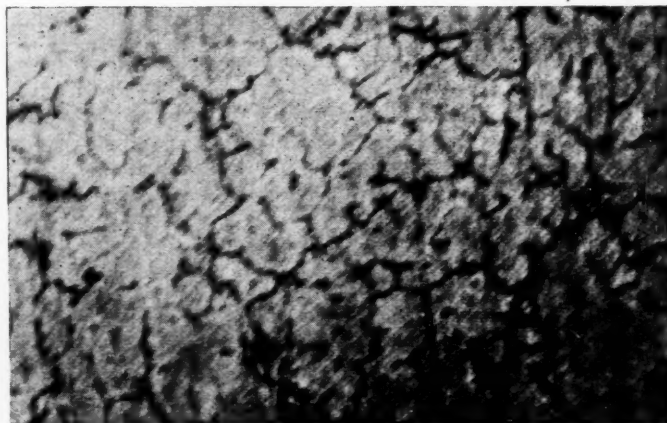


Fig. 2—A new French aluminum-copper piston alloy which shows much less porosity than the alloy represented by Fig. 1

Variations in the quality of aluminum alloys are marked. The two micro-photographs shown herewith give an illustration of this. The micro-photograph shown in Fig. 1 is of a well-known American alloy which has been on the market for some time. It has an aluminum content of 86.16 per cent; copper of 10.56 per cent, and iron of 1.75 per cent, the remainder being made up of manganese and zinc. This is a sand casting, and the photograph is magnified 350 diameters. The hole (black spot) shown in the micro-photograph is characteristic of sand castings with this metal.

### A New French Alloy

The micro-photograph shown in Fig. 2 is of a new French alloy which is just being introduced for piston work. This is also a sand casting, and it will be noted that what holes there are are very minute and hardly show up on this micro-photograph, which is also a magnification of 350 diameters. The characteristics of these two samples are given in the tabulation. Sample A is the metal shown in Fig. 2 and Sample B the metal shown in Fig. 1. The materials of the cast-iron piston used by the concern whose laboratory is conducting these experiments show the following analysis:

	Per Cent
Silicon .....	2.52
Sulphur .....	0.138
Phosphorus .....	0.268
Manganese .....	0.79
Combined carbon .....	0.53
Total carbon .....	2.97

In working out a successful piston design for high-speed work, one of the principal characteristics which must be aimed at is ample structural strength and ample

### Expansion of Aluminum Piston Test Bars—Temperature Taken in Boiling Water.

	60 deg. Fahr.	212 deg. Fahr.	Expansion in per cent.
Sample A...	5.002 in.	5.011 in.	.180
	4.999 in.	5.008 in.	.180
Sample B...	2.767 in.	2.772 in.	.1905
	2.752 in.	2.757 in.	.1816
Sample C...	5.011 in.	5.017 in.	.1196
Cast iron...	5.013 in.	5.019 in.	.1194

provision for heat dissipation. The clearances also are highly important, as the pistons must not seize at high temperature, nor be so loose as to permit oil pumping at low temperature, before the engine has become fully warmed up. The drawing herewith shows an aluminum piston used successfully in a racing car with a bore of  $3\frac{1}{2}$  in. As will be noted, the overall length of the piston is  $3\frac{27}{32}$  in., or slightly more than the bore. In the grinding work a tolerance of 0.002 in. is allowed, with no tolerance on the negative side. The piston has two rings and an oil relief groove above the wrist pin. It is also deeply ribbed, as indicated in the drawing.

The wall has a constant thickness in the skirt of 0.244 in. with 0.002 in. tolerance. The maximum allowable diameter, therefore, is 3.496 in., giving a clearance of 0.004 in. at the skirt. At the top of the piston the maximum allowable diameter is 3.485 in., corresponding to a clearance of 0.015 in. This is about 50 per cent greater than that allowed with a corresponding iron piston, and is about what would be expected from the coefficients of expansion indicated in the tabulation herewith. The alloy used in the piston shown in the detail drawing is magnalium, and is not one of the alloys shown in the two micro-photographs. Magnalium is an alloy of aluminum and magnesium of secret composition, which is lighter than aluminum.

Some of the most interesting physical properties of aluminum have been discovered only recently. For instance, it has been known only for a few years that the thermal conductivity of aluminum increases with its temperature, and that at 700 deg. Fahr. it has practically three times the heat conductivity as at ordinary temperatures. Among the baser metals there is only one, copper, whose heat conductivity increases with the temperature. Aluminum is only exceeded by gold in the quality of malleability, and is ahead of silver, copper, tin and platinum in this respect. It is the sixth metal in rank of ductility. The tensile strength of pure aluminum is about 15,000 lb. per square inch. In the alloys the tensile strength runs higher than this. Aluminum is too soft to be used in an unalloyed condition, as castings made from it lack rigidity. The principal piston alloys have been made of copper and aluminum, although the zinc alloys have been fairly successful, particularly in some of the die-casting work, and magnesium alloys have been developed as stated.

A complete detail drawing of a lynite aluminum piston, as used in the Premier engine, is shown in Fig. 4. This is an aluminum motor with a gray-iron cylinder wall liner. The cylinder sleeve in which this piston operates has a  $5/32$ -in.

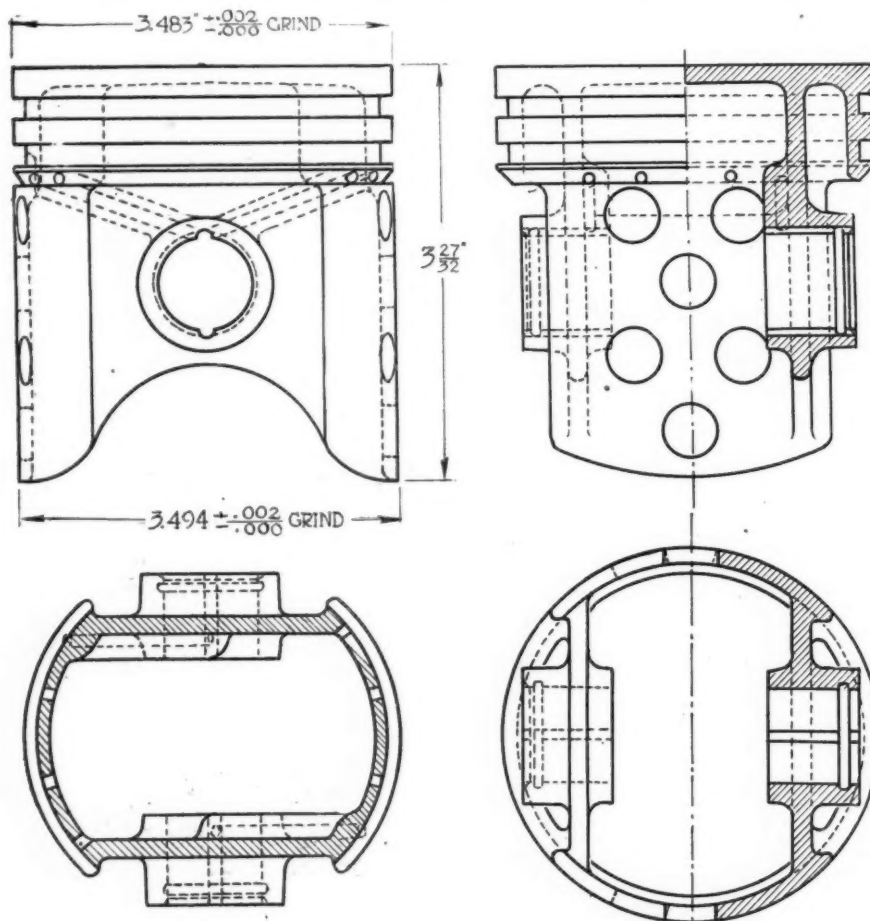


Fig. 3—Dimensioned drawing of a successful aluminum alloy racing piston



wall. The sleeve is ground to a high finish on the inside, and the limits in the sleeve are 3.374 in. and 3.375 in. Comparing this with the limits given on the piston, with a cold engine, there is a maximum piston clearance on the skirt of 0.006 in. and a minimum clearance of 0.004 in. This might seem entirely too tight for aluminum pistons, but it has been found that maximum car speed can be sustained with a lesser amount of trouble than is experienced with gray-iron pistons in a conventional cast-iron engine with cast-iron piston commercial fits.

C. S. Crawford of the Premier Co. has found by extensive experiments that the fit of the piston ring gap has quite a bearing on the seizing of pistons. For example, a piston ring which has its gap closed when used on a cast-iron piston at maximum speed will bind tight when used on an aluminum piston. The piston ring gets considerably hotter in an aluminum piston than it does in a gray-iron one, and for that reason needs more gap clearance.

#### Oil Scraper Ring Found Unnecessary

It will be noted on the piston print that at one time there was a ring located below the pin, and that this ring has been removed. It was originally put there for the purpose of holding down oil. It was later found, however, that if all of the rings had the proper gap clearance this lower ring would keep the upper part of the piston starved of oil. On the other hand, if three upper rings had a tight gap and the lower ring had a tight gap with a warm engine, the rings were forced out of round and the oil would go by the edge of the ring.

The lower ring was removed and a gap from 0.012 in. to 0.016 in. was used on the three upper rings when the rings were fitted to a 3.374-in. bore. With this apparently excessive gap the ring contacts with the cylinder all around and is not distorted by end pressure on the gap, with the result that the rings keep the oil from pumping by.

There is one car in the Premier experimental department which has a little over 50,000 miles to its credit this year, and the rings fit almost as snugly to the ring grooves now as the day the motor was put into use. Considerably more speed and power is secured from an engine when fitted with a wide gap on the rings than with a closer one. In commenting on this piston Crawford says:

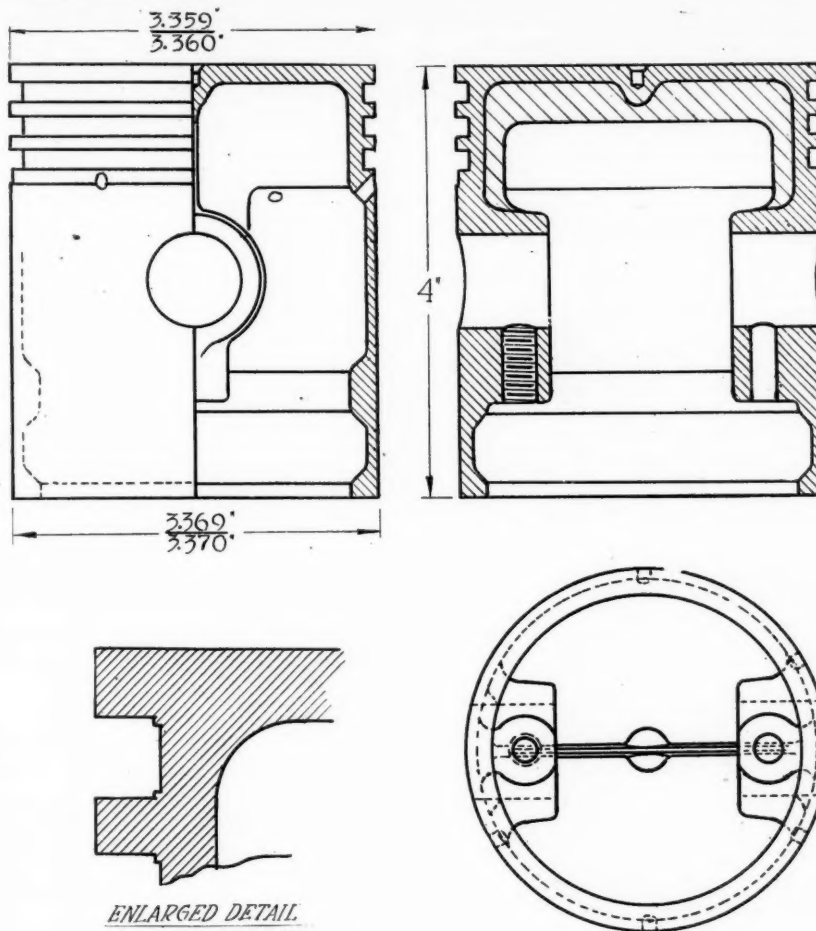


Fig. 4—Dimensioned drawing of Premier aluminum piston

"Another point that I would like to call your attention to is that we anchor the piston pin tight in one side of the piston and allow it to float in the opposite side. The method used at first was to drop the pistons into boiling water so that the piston pin would tap lightly into the bosses of the piston. We found this to be bad practice, because when the piston cooled down it hung on the pins and went out of round, with the result that in winter time it was almost impossible to crank engines over on account of the out-of-round piston seizing after the cylinder walls had cooled. We now tap the piston pin very lightly into the piston when piston and pin are both cold. The pin is then locked on one side. As soon as the piston takes on a little heat the pin is free to slide. This absolutely prevents any distortion in a cold or hot engine, with the result that the 'hanging' of the piston on the cylinder walls in a cold engine in winter is entirely eliminated."

## New German Airplane Has Biplane Tail

AN idea of the rapidity in advancement of airplane construction in Europe may be gained from the fact that recently new types of German machines have been described in British and French aircraft papers almost every week. The latest type of enemy airplane to receive publicity of this sort is known, as the H. W., and is a two-seater biplane. As yet there is only very little information of a technical nature available regarding this machine, as the only sample that has been brought down caught fire and was badly burned. The upper wings have a span of about 36 ft., and the lower of 33 ft. The wings have a positive stagger and a dihedral angle, but no sweep-back. The upper wings are of trapezoidal

form with balanced ailerons, the trailing edge of which is extended. The lower wings are of the same trapezoidal form, but their rear corners are rounded off.

There is one pair of upper plane struts on either side of the body, these slanting forward in accordance with the stagger, and also outward. These struts are made of streamlined steel tubes. The most novel feature of the machine is the biplane tail, the top plane of which is considerably smaller.

These H. W. biplanes have an armament consisting of two machine guns, one in front and the other in the rear, and some of the machines of this type are also equipped with bomb racks.

# AUTOMOTIVE INDUSTRIES

## AUTOMOBILE

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## Some Interpretation Needed

THE steel agreement, giving control to the War Industries Board, leaves the automobile industry in an uncertain position. Despite the claims of officials that the agreement will not alter steel shipments but will act merely as a check-up scheme, it is vague and indefinite.

It speaks of a "revised selected list" to be issued later, but of which officials proclaim ignorance. It tells of commodities to be given preference and in the same breath mentions such indefinite items as "necessary transportation equipment" and "public utilities," and none of the officials responsible for the agreement will accept the responsibility of interpreting it. They refuse to commit themselves as to the classifications of passenger cars, commercial trucks or even trucks engaged in rural express service.

The plan of the War Industries Board appears to be "let us act first and decide some other time," regardless of consequences.

## Measuring Gear Efficiency

UNTIL recently the only available method of determining the efficiency of gear drives was to measure the input by a transmission dynamometer and the output by an absorption dynamometer, and then divide the output by the input. This method is very crude and the results it gives are anything but reliable, owing to the fact that the two quantities which must be measured by different devices are so nearly alike. In fact, these quantities have become more nearly alike in recent years with refinements in gear cutting and the practice of mounting gear shafts on anti-friction bearings. It is probably for this reason that comparatively few tests of gear efficiency have been made, or, at least, published.

### Lanchesters' Method

A great advance in methods of testing worm drives for efficiency was made by Lanchester some years ago. His method is based on the principle of torque reaction around the driving and driven shafts. The entire worm drive is mounted in such a way that it can rock around two axes at right angles to each other, the worm axis and the wheel axis. The tendency of the gear or drive to turn is balanced by a single weight, and from the distances of this weight from the worm axis and the wheel axis respectively, when the system is in balance, the efficiency can be directly calculated.

A somewhat similar principle underlies the test apparatus devised by Professor Allen, described by him in an A. S. M. E. paper which is abstracted elsewhere in this issue. It is of broader scope, however, as it can be applied to gear drives of any kind. The turning moments due to the reactions of the driving and driven shafts respectively are applied to the arms of a lever whose lengths bear to each other the same ratio as the speeds of the shafts. If there were no loss in the transmission the lever would remain in balance. But as there always is a certain amount of loss the moment due to the torque on the driven shaft is less, and the difference, which measures the loss, is carefully determined by means of a sliding weight.

### Simple Testing Device

A testing device of this kind is comparatively low in first cost and is quite simple to operate. Evidently the absorption dynamometer need not necessarily be of the hydraulic type, and an electric cradle dynamometer would do as well. The apparatus would seem to lend itself well to investigations to determine the comparative merits of different gear lubricants, different methods of gear cutting (so far as accuracy of work and resulting efficiency are concerned), etc. There has been considerable popular interest in regard to the efficiencies of different types of gearing, and while it is probably too much to hope that it will ever be possible to give definite figures for their relative efficiencies, we may expect that before many years are past there will be available a considerable mass of reliable data upon which a sound opinion may be based.



## Employers, Let the Industrial Training Section Aid You

THESE reports come to Washington:

One Cleveland factory employing 600 workers suffered 2500 absentees in April—25,300 working hours lost.

Labor turnover in a Michigan plant is 10 per cent a week—5500 are taken on while 550 quit every 7 days.

An aircraft factory, having difficulty in securing labor, was forced to pay \$40 per week, minimum, to employ 1000 skilled workers.

Factories, seeking men, finding them scarce, blocked by housing conditions, find that every worker, imported, means housing for 3 more people, making impossible conditions.

These and other vital problems vex every employer to-day. Large wages, numerous jobs, the tremendous demand for workers, have turned labor conditions into chaos.

For all these troubles there are certain reliefs. H. E. Miles, chairman Section on Industrial Training, Council of National Defense, is the doctor.

Mr. Miles, through his industrial training plans, has reduced absentees, lowered turnover from 10 per cent per week to 3 per cent per annum, cut labor cost, eliminated need for housing construction.

Following are some examples of the results of this work, described more completely in a recent issue of AUTOMOTIVE INDUSTRIES:

The airplane factory paying \$40, weekly minimum, put in a training room and upgraded the unskilled men workers, employed 1000 women, trained them in the training room, and secured thoroughly satisfactory results.

The Lincoln Motors Co., busy on airplane work, needing 300 workers, unable to secure men, put in a training room, advertised for women, had 1600 answers, selected those with relatives at the front, put them through the training school and now has utmost efficiency from them in all sorts of difficult machine work.

The Curtiss Aeroplane & Motors Corp. instituted a training room and in 7 weeks turned out hundreds of skilled workers, superior to the regular skilled help. The labor turnover, running into thousands annually, has become an unimportant factor. Women were taught to splice cables better than the men in 4 days. The workers in the training room now do splicing in 48 minutes that formerly required 60 minutes by the regular skilled men.

The specially skilled workers do not quit their jobs. Further, they prefer to go back to the skilled work if once laid off. The Dayton Recording & Computing Co., laying off 2200 workers who had gone through the training room, got 2100 back by a small newspaper advertisement.

The gross training of this course costs about \$3 per operative, as against the expenses of a company such as the airplane concern that paid a minimum of \$40 weekly per man simply to get operatives on the payroll, not counting the exorbitant cost of breaking in, quitting and re-employing, which is estimated at \$50 to \$150 per man.

The training schools do not stop at semi-skilled work. One of the great Rochester companies making tools for optical sights requiring perfect precision is daily graduating workers from its training room for such work.

Get acquainted with Mr. Miles and his work. Many companies are now sending observers to study and learn the training-room plan at other factories.

This nation will soon require 1,500,000 more skilled workers than are now available.

If you were told that next year will witness a great shortage of fuel or steel, you would look out for your business to-day. You would place your contracts immediately. You would be prepared for the shortage.

Human labor is the fundamental of the industrial world, more vital than any materials.

And every employer engaged in war work owes it not only to himself, but to the nation as a patriotic duty, as a great effort toward victory in this war, to prepare for the possible labor shortage, to contract now against future trouble by utilizing Mr. Miles' knowledge and plans, by installing a training room.

Mr. Miles works for the United States. There is no charge for his service.

# □ Latest News of the

## Liberty Engine at S. A. E. Meeting

### Long List of War Apparatus To Be Shown, Including Foreign Engines

NEW YORK, June 13—With 950 tickets sold for the Orville Wright dinner, to be held Monday evening, June 17, in connection with the summer meeting of the Society of Automotive Engineers at Dayton, Ohio, a big attendance at the two days of the session is assured. The list of promised exhibits of war apparatus, with the designing of which S. A. E. members have had so much to do, is now so large as to prove one of the greatest attractions that the society has offered to its members and guests at any of its meetings.

The leading exhibit will be the Liberty aviation engine, which will be shown together with all of the parts entering into it, and in addition one of these engines will be running on a block in Triangle Park, where the meeting is to be held. It will be the first public view of this engine.

The other exhibits will include war apparatus of nearly as great interest. There will be displayed seven or eight European aviation engines of British, French and German manufacture. Planes of European manufacture, including German planes captured on the French front, will be shown. The plane exhibit will include the de Havilland fighting plane now being manufactured in quantities in America. In addition there will be an exhibit of parts entering into the plane.

Perhaps as useful an exhibit as will be staged will be that of a Defiance propeller-making machine, which will be set up in the park and constantly running on the manufacture of propellers the same as if it were mounted in the factory.

The mounting of machine guns and the synchronizing of these guns so that they fire between propeller blades on a de Havilland plane will be one of the noisy as well as interesting exhibits.

The exhibits will not all be confined to airplane apparatus, but will include ordnance apparatus, vehicles for the Quartermaster's department and also ambulances and ambulance trailers. It is possible there will be a captive balloon, together with all of the apparatus required in handling it.

The farm tractor exhibit will consist of several different makes of tractors that will be demonstrated in rough ground in Triangle Park.

The complete program for the profession session, which will occupy perhaps one-half of the time of the session, gives a good deal of time to aviation subjects. The exhibit of gasoline distillation will be filled with interest. The subjects to be covered in the program are:

Petroleum Refining, with Demonstration, C. W. Stratford.

Heavy Oil Engines, C. E. Sargent.

Heavy Oil Engines, P. L. Scott.

Airplane Propeller Design, F. W. Caldwell.

Airplanes of To-day, Fay L. Faurote.

Present Day Problems in Aeronautics, W. B. Stout.

Comparison of Modern Aviation Engines, Herbert Chase.

Symposium on Tractor Development.

Reports on International Aircraft Conference, C. M. Manly, E. H. Efram, C. F. Clarkson.

Triangle Park, in which the meetings will be held, is the privately owned park of the Delco, Dayton-Wright and other Dayton companies, which is for the use of their employees. There is in it a very large pavilion, in which the meetings will be held, and also a large dining hall which will seat over 1000, as well as other buildings which will meet all of the needs of the members. The park will be turned over exclusively for the two days to the S. A. E.

## To Issue Factory Permits Only for South and West

WASHINGTON, June 12—War orders and permits for the building of factories will be issued for the present to companies in the middle west and southern states where coal can be transported in larger quantities and with less difficulty.

There will be no further increase in the volume of war orders, or number of establishments handling them in the New England states, eastern and southern New York, Pennsylvania as far west as Williamsport, New Jersey, Delaware and eastern Maryland not including Baltimore. The congestion of manufacturing and transportation in these districts has stimulated the War Industries Board, the Fuel Administration and the Railroad Administration to issue regulations completely stopping additional placing of war orders, and building of factories throughout this territory. Exception to this policy will be made only in unavoidable cases.

The congested district comprises those eastern states which have so large a proportion of war industries that it is difficult to supply all the necessary raw material and fuel. This difficulty obtains because coal for these industries is mined west of the Alleghenies.

## Detroit Optimistic Over Steel

### None of Industries Has Been Officially Informed of Need for Curtailment

DETROIT, June 11—None of the industries in this territory has received any official notification from Washington advising it that the supply of steel and iron would be cut off as a result of the action taken by the War Industries Board in agreement with the American Iron & Steel Institute. It is already understood by the industries that the entire steel supply of the nation is under absolute government control by priorities and this new order, if such has been issued, is interpreted as amounting to the same thing.

The steel shortage began to be felt in April as evidenced by the decrease of production. All the manufacturers, however, did not suffer at the same time. Those whose supply of steel was great were able to maintain their production for some time before a decline in output was made manifest.

Viewing the situation as a whole, the downward curve of production is not very marked, as some of the manufacturers have been able to maintain the same output for some time and those whose production of necessity was decreased do not show a great percentage of reduction.

Inasmuch as there is much more steel produced than the government can use, the industries feel assured they will not suffer any more than they have and believe that within 90 days the situation will be clarified. They feel that within this time an oversupply of steel will be available.

The Ford Motor Co. is still maintaining a production of 1550 cars a day; the output of the Olds Motor Works is now 100 cars a day, compared with a month's production 2 months ago of 120. This decrease is not marked; The Willys-Overland Co. is turning out 425 cars a day. This reduction began June 1. Production averaged 450 cars a day the month previous; Reo has maintained an output of 80 cars daily for some time. Daily production of Packard is 14, which is the same as it has been for several months; Buick's daily output averages 300 cars; Cadillac, Chalmers, Maxwell and Hupp production has been the same for some time.

Although passenger car manufacturers have felt some shortage of steel, the truck manufacturers in most cases have been able to increase their output. This

(Continued on page 1156)



# Automotive Industries □

## Government Factory for Airplanes

Bill to Form \$100,000,000  
Firm to Exist for Period  
of War

WASHINGTON, June 11—Organization of the United States Aircraft Corp. by the Director of Aircraft Production is proposed in a bill introduced yesterday by Chairman Chamberlain of the Senate Military Affairs Committee.

The corporation would direct production of aircraft and equipment or materials therefor. It would be formed under the laws of the District of Columbia, with a maximum capital stock issue of \$100,000,000. It would have the power to produce, purchase, manufacture or sell aircraft, aircraft equipment or materials therefor, and to build and operate railroads in connection. The Government would control the majority stock.

The corporation would be dissolved within 1 year after peace is signed. Enlisted men or commissioned officers would be detailed by the Secretary of War to work together with civilians, under the direction of the Director of Aircraft Production.

The Secretary of War would be authorized by the bill to transfer to this corporation any interest of the Government in existing trucks for aircraft equipment or materials, and the title to lands, plants, railroads or equipment used in connection with the production of aircraft in which the United States has any interest.

Following is the complete bill:

### A BILL

Authorizing the Director of Aircraft Production to form a corporation or corporations to facilitate and expedite the production of aircraft, aircraft equipment, or materials therefor.

Be it enacted that the Director of Aircraft Production may, whenever in his judgment to do so will facilitate and expedite the production of aircraft, aircraft equipment, or materials therefor, for the United States and governments allied with it in the prosecution of the present war, form under the laws of the District of Columbia or under the laws of any State one or more corporations for the purchase, production, manufacture and sale of aircraft, aircraft equipment, or materials therefor, and to build, own, and operate railroads in connection therewith. The total capital stock of the corporation or corporations so formed, together with any bonds, notes, debentures, or other securities issued by them, shall not at any one time exceed \$100,000,000.

That the Director of Aircraft Production may, for and on behalf of the United States, subscribe purchase, and vote not less than a majority of the voting capital stock of any such corporation, and may purchase for and on behalf of the United States all or any part of the preferred non-voting stock, bonds, notes, debentures, or other securities issued by such corporations, and do all things necessary to protect the interests of the United States and to carry out the purpose of this Act; and, with the approval of the

Secretary of War, may sell any or all of the stock, bonds, notes, debentures, or other securities of the United States in such corporation: Provided, That at no time shall the United States be a minority holder of voting stock therein. Any sums heretofore or hereafter appropriated for the purchase or procurement of aircraft, aircraft equipment, or materials therefor, for the army shall be available for the purchase of the capital stock of such corporation, or corporations, or their bonds, notes, debentures, or other securities.

That within 1 year from the signing of a treaty of peace with the Imperial German Government the Director of Aircraft Production shall, on behalf of the United States as a stockholder, institute such proceedings as are necessary to dissolve such corporation or corporations under the laws of the District of Columbia or the State or States under which such corporation or corporations are organized. Upon the dissolution of the corporation or corporations the same shall be liquidated and the assets distributed in accordance with the laws of the District of Columbia or the State or States under which such corporation or corporations are organized.

That the Secretary of War is hereby authorized to assign for duty, under the direction of the Director of Aircraft Production, any enlisted men or commissioned officers, from time to time, in the military organization as he shall deem necessary or desirable to carry on the work of such corporation or corporations: Provided, That nothing in this Act contained shall prevent such corporation or corporations from employing civilians in the manner customary in the conduct of ordinary business under corporate organization.

That the Secretary of War, acting through the Director of Aircraft Production, is authorized to transfer, by appropriate instruments, to any such corporation as may be found under this Act, any interest of the United States in any existing contracts for aircraft, aircraft equipment, or materials therefor, and the title to any lands, plants, railroads, or equipment used in or in connection with the production of aircraft, aircraft equipment, or materials therefor, on such terms as the Secretary of War, acting through the Director of Aircraft Production, shall deem fit.

### Opposed to Car Owner Taxation

WASHINGTON, D. C., June 13—Congressman Cox of Ohio yesterday addressed the Ways and Means Committee regarding his proposed bill. The committee does not favor the taxing of users of automobiles. They believe that if they tax automobile users they would also have to tax individuals who wear jewelry. The principle is the same and they would prefer to tax jewelry wearers because automobiles are more useful. Congressman Cox further advocated placing a tax of from \$10 to \$50 on the employers of chauffeurs and a high tax on gasoline used for passenger cars. He stated that he did not believe the makers of automobiles should be taxed further. His suggestion met with the disapproval of the Ways and Means Committee in every instance.

### Bosch Sells Plainfield Plant

NEW YORK, June 12—The Bosch Magneto Co. has disposed of its Plainfield, N. J., plants to the Raymond Engineering Corp., New York, which manufactures gun sights, respirators and rifle magazines.

## Garfield Denies Fuel Curtailment

No Order Reducing 1918 Coal  
Supply to 25 Per Cent Has  
Ever Been Issued

WASHINGTON, June 13—Despite rumors in daily papers to the effect that Dr. H. A. Garfield, Fuel Administrator, has issued an order allowing automobile companies building passenger cars only 25 per cent of the coal for the year beginning Aug. 1, that they used in the previous year, Dr. Garfield has specifically denied to AUTOMOTIVE INDUSTRIES having issued any such order.

It seems that newspaper representatives have construed into an order from the Fuel Administrator what was apparently merely a discussion of the subject. The Fuel Administrator is very emphatic in his denial of this report and on the other hand declares that he recognizes the importance of maintaining every industry at the highest production degree possible. The Fuel Administration is trying to secure sufficient coal without crippling any industry. It has for some time been seriously considering coal conservation, but has made no definite curtailment figures and at this time has not arrived at a decision as to how it will effect conservation of coal among the non-war industries.

Telling of the harm which would come to this country if non-war industries are closed down, the Fuel Administration is attempting to conserve coal by a propaganda designed purposely to prevent curtailment of non-war industries. It points out that if non-war industries must supply the coal deficit, these industries employing millions of our population, and providing the backbone of our national wealth will have to shut down with consequent decrease in prosperity and reduction in men employed in exact proportion to the coal deficit. It adds that every ton of coal saved will keep 50 workmen from idleness, and permit an additional creation of several hundred dollars worth of national wealth.

The publicity issued by the department states that there will be a shortage of probably 70,000,000 tons of coal. This can be equalized to a large degree by conservation methods. The "skip stop" street car schedules are expected to save 1,000,000 tons of coal, consolidation of

(Continued on page 1153)

## Virtues of Liberty Engine Cited Anew

National Advisory Committee on Aeronautics in Statement Says That This Type Develops a Maximum of Horsepower Per Unit of Weight—Average Fuel Consumption Lowest

WASHINGTON, June 8—The Liberty airplane engine developing a maximum of 450 hp. at a weight of 825 lb. or 1.83 lb. per hp. is 50 per cent more powerful and 25 per cent lighter per hp. than the average airplane engine in service to-day, according to a statement by the National Advisory Committee on Aeronautics. In March, 1918, the Liberty engine developed 432 hp. at a weight of 808 lb. or 1.86 lb. per hp. In May, following improvements, it developed 450 hp. at a weight of 825 lb. or 1.83 lb. per hp. In 1917 the Liberty engine was 65 per cent more powerful and 28 per cent lighter per hp. than the average in service for that year.

The average fuel consumption of the Liberty engine to-day is .46 lb. per hp. per hour.

The committee, in its statement, shows that the Wolsley engine in 1913 could obtain only 147 hp. at 1400 r.p.m. from 8 cylinders, 5 x 7 in. or 18.375 hp. per cylinder. This is the same size cylinder as is used in the Liberty engine and which now gives 450 hp. at 1800 revolutions from 12 cylinders, or 37.5 hp. per cylinder. This is double the power per cylinder obtained in the Wolsley. The latter weighs 4.9 lb. per hp. as compared with

2.3 lb. for the Liberty at the same speed of 1400 r.p.m.

The statement explains that the first man-carrying airplane flights were made in 1903 with the Wright engine, developing 12 hp. and weighing 152 lb. or 12.7 lb. per hp. In 1910, 7 years later, the average horse-power of airplane engines had increased to 54 and the weight decreased to 5.7 lb. per hp. In 1917, the average power output had advanced to 243 hp. and the weight decreased to 2.8 lb. per hp. Again in 1918, the horse-power advanced with the perfection of the Liberty engine to 450 hp. for a weight of 825 lb. or 1.83 lb. per hp.

The average fuel consumption decreased from .8 lb. per hp. in 1903 to .65 lb. in 1914, since which it has slowly dropped to .55 lb. and for the Liberty engine to .15 lb. The present Liberty consumption is approximately .46 lb. per hp. per hour.

At the bottom of the page is a table which shows the advance in the power and weight ratio by years for the engines in actual flying use. The Langley-Manly engine, built in 1901, developing 52 hp. at 2.9 lb. per hp., was apparently 9 years ahead of its time in the

matter of power output, and 16 years ahead in the ratio of horsepower to weight.

The greatest advance in any one year took place in 1917. The average horsepower at the beginning of the year was 243, and the average weight per horsepower was 2.8 lb. When the 1917 Liberty engine was developed, the horsepower was increased to 400, and the weight per horsepower reduced to 2.0 lb.

### University of Michigan to Train Women

ANN ARBOR, MICH., June 9—The University of Michigan has appointed a committee of ten members of the faculty to get in touch with Detroit manufacturers and find out what training the university may give women to increase their value in industry. It is planned to give short, intensive courses extending over a period of 6 or 8 weeks to train them in useful work. The Detroit Chamber of Commerce has appointed Howard Coffin chairman of the Labor Committee which will confer with manufacturers on this matter. Letters have been received by the university from several Detroit companies giving assurances of their co-operation.

### Seek Protection Against Airplane Attacks

WASHINGTON, June 7—An appropriation of \$16,000,000 to establish 16 airplane and balloon stations on the Atlantic and Pacific coasts as a means of protection against aerial and submarine attacks was asked for yesterday by Secretary of War Baker. The sites for the stations have been selected, 13 on the Atlantic and 3 on the Pacific. The equipment is immediately available, and they can be established within 6 weeks. The \$16,000,000 will be included in the \$7,000,000,000 Fortifications Bill to be presented to the House of Representatives next week.

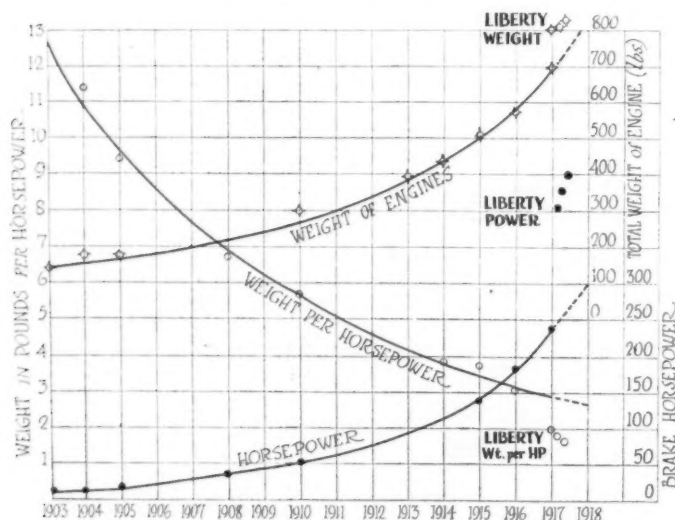
### Complaint Against Ford & Son

CHICAGO, June 9—A complaint has been filed against Henry Ford & Son before the Federal Trade Commission by the Maxwell Implement Co., Valparaiso, Ind., alleging an unfair practice by the unauthorized use of the names of Governor Goodrich of Indiana and Prof. T. A. Coleman of Purdue University. In a recent advertisement announcing a sale of Fordson tractors, the Governor was represented as sanctioning the movement, and Prof. Coleman as supervising the distribution. Both men have disclaimed any connection with the scheme and have said the use of their names was unauthorized. The filing of the complaint followed.

### To Increase Spruce Production

WASHINGTON, June 11—Production of spruce for airplanes will be increased by the addition of 9000 workers to the present ranks. Provost Marshal Crowder to-day sent out a call for 9000 limited service men of draft age. These men will be sent to the Northwest.

Liberty Engine Compared With the Average



Graph showing variation of horsepower, weight and weight per horsepower of aircraft engines from 1903 to 1918

### Advance in Power and Weight Ratios of Airplane Engines by Years

	Year	Horsepower	Weight	Weight Per Hp.
Langley-Manly Engine.....	1901	52	151	2.9
Original Wright Bros.....	1903	12	152	12.7
Improved Wright Bros.....	1904	16	180	11.4
Improved Wright Bros.....	1905	19	180	9.4
Redesigned Wright Bros.....	1908	35	182	5.5
Average on Market.....	1910	54	309	5.7
Wolsley Engine.....	1913	147	720	4.9
Average on Market.....	1914	112	437	3.9
Average on Market.....	1915	133	512	3.8
Average on Market.....	1916	185	570	3.1
Average on Market.....	1917	243	693	2.8
Liberty 12 cyl.....	1917	400	801	2.0
Liberty 12 cyl. (March).....	1918	432	808	1.9
Liberty 12 cyl. (May).....	1918	450	825	1.8



## N. A. C. C. to Develop Standardization

Committee Appointed to Delve Into Problems as New Economy Measure

NEW YORK, June 7—The National Automobile Chamber of Commerce at its annual meeting yesterday and to-day decided to appoint a committee to delve deeply into standardization and conservation matters with a view to co-operating more closely with the Government in saving materials. Charles Clifton, president of the Pierce-Arrow Motor Car Co., Buffalo, was re-elected president, and all other officers were re-elected. The only change made is in the Board of Directors, where H. H. Rice of the Chevrolet Motor Co. takes the place of the late Colonel Pope.

In the matter of conservation, it is the plan of the Chamber to investigate the possibility of eliminating a number of non-essentials, such as the use of virgin wool for upholstery material, and vanity curtains in limousines. An effort will be made to substitute more common materials for those needed for war work, such as chromium steel and tin.

During the past year thirteen manufacturers of trucks have been admitted to membership, bringing the list up to 52 makers of trucks and 85 of passenger cars. The companies added were: Acme Motor Truck Co., Cadillac, Mich.; Bethlehem Motors Corp., Allentown, Pa.; Brockway Motor Truck Co., Cortland, N. Y.; Clyde Cars Co., Clyde, O.; Diamond T Motor Car Co., Chicago; Dorris Motor Car Co., St. Louis; Republic Motor Truck Co., Alma, Mich.; Sanford Motor Truck Co., Syracuse; Schacht Motor Truck Co., G. A., Cincinnati; Service Motor Truck Co., Wabash, Ind.; Standard Motor Truck Co., Detroit; Stewart Motor Corp., Buffalo; United Motors Co., Grand Rapids, Mich.; Ward Motor Vehicle Co., Mount Vernon, N. Y.

It has been recommended that the Motor Truck Division appoint a committee to investigate the possibility of further standardization, particularly with reference to axle widths and treads. Roy D. Chapin, chairman of the Highways Transport Committee, addressed the meeting on Return Loads Bureaus, and Samuel Miles spoke on the development of Rural Express Routes in which the Chamber is taking an active interest and to which it is lending every support. The production of trucks, it was pointed out, has increased 100 per cent during the past 6 months, as compared with the same period last year.

The Traffic Committee estimates that the 25 per cent increase in freight rates which is to go into effect June 25 will mean an increase of \$6,000,000 in the cost of transportation, based on shipments equal to those of last year. A standard 36-ft. carload shipment will cost \$19.25 more between Detroit and New York and \$77.50 more between Detroit and San Francisco than under the

old rates. Through intensive loading methods, which means improved double decking and partial crating, some members have been able to increase the capacity of freight cars from 50 to 100 per cent.

The proposed ruling of the railroads to require that cylinders, cylinder blocks and castings, and transmission cases be boxed for shipment, has been abandoned, following protests from the Traffic Committee of the Chamber. Such parts may now be shipped in racked cars. It is expected that the proposed Consolidated Classification, which is to be a combination of the present Western, Eastern or Official, and Southern classifications, will be completed some time this month and though this may not affect rates, it will provide for uniform descriptions and weights throughout the country.

Drive-aways are dropping slightly in the aggregate, due to the reduced output of factories. The Chamber is actively working through the various State Councils of Defense to eliminate interference with strings of cars en route by officious or over-zealous police authorities.

The Export Committee of the Chamber is to make a special study of packing and crating for export with a view to adopting such measures as may seem advisable to conserve shipping space. It will also investigate the possible application of the Webb bill to the automobile industry.

With regard to the truck and tractor show which is to be held in Chicago this Fall, it was decided to notify members of the Chicago Automobile Dealers Assn. that their participation be left to their own discretion. It was the sentiment of the truck makers themselves that they would not exhibit because it is deemed that the time is inopportune.

The next meeting of the Chamber will be held at the New York offices on July 10.

### White Truck Production Increases

CLEVELAND, June 8—The White company manufactured 5900 trucks and 1000 passenger cars in 1917. It is reported that the output of passenger cars this year may not be more than 100. Truck business, on the other hand, will be 60 per cent larger than that of last year, it is stated. The company is now working on an order for 3000 1 and 2-ton army trucks, and is finishing an order for 1500 trucks for France. Eight thousand trucks have been delivered to Russia and 6000 to France since August, 1914. The capacity of the plant is 32 trucks a day, and this will be increased to 50. It is reported that the year's business will amount to between \$40,000,000 and \$45,000,000. More than 70 per cent of the company's capacity is given over to war work.

### Weidenbach to Supervise Airplane Mail

WASHINGTON, June 8—Captain C. A. Weidenbach, Signal Corps, who has seen 3 months' service in France, has been appointed supervisor of the airplane mail service between Washington and New York.

## Will Need More Coal for Michigan

If State Receives Only Three-Quarters of 1917-1918 Supply Industries Will Suffer

DETROIT, June 8—If the state of Michigan is to receive only three-quarters of its normal anthracite coal supply this year, as indicated by a statement issued by the Anthracite Committee, this section will suffer a coal famine as severe as the one last year. Using the season 1916-17 as a basic coal year, the committee has allotted Michigan only 1,201,000 cars of coal this year, or a decrease of 24.42 per cent. The entire central states will receive an allotment showing a decrease of 31.73 per cent according to the following table:

States	1916-17 Distribution	1918-19 Allotment	Per Cent Decrease
Ohio .....	585,626	246,250	57.95
Indiana ...	710,274	284,110	60.00
Illinois ...	2,215,122	1,750,585	20.97
Michigan ..	1,589,002	1,201,000	24.42
Total decrease Central States.....			31.73

New England and Atlantic states will receive a greater allotment this year. More than 2,000,000 cars of anthracite will thus be diverted from the Central States.

The following table shows the number of cars of coal, both anthracite and bituminous, arriving for Detroit and Michigan as reported by the American Railway Assn.:

Month	Detroit	Michigan
February .....	13,620	14,495
March .....	19,904	19,493
April .....	14,208	16,941
May .....	14,107	14,670

On April 1, 720 cars arrived; the next day 637 cars came in; the following day a lesser number was received, and fewer cars arrived each succeeding day until the end of May, when only a total of 334 was registered. This indicates how coal shipments are decreasing. Freight rates will advance on June 25, 50 cents on anthracite and 30 cents on bituminous.

No fear of lack of coal need be expressed unless the quantity shipped becomes much less than it is. If, however, insufficient quantities of anthracite coal arrive it will mean that industries will have to share part of their supplies with the householders and be obliged to retard their production.

### Tractor Plant for Kansas City

KANSAS CITY, June 9—The Illinois Silo & Tractor Co., of Bloomington, Ill., will establish a tractor assembling plant here. The company has bought a site at Sixtieth and Holmes Streets and plans for the building are being drawn.

### Columbus Factory for C. A. S. Products

COLUMBUS, OHIO, June 9—The C. A. S. Products Co. will erect a factory here which will be ready for occupancy by the middle of July. The present capacity will be quadrupled.

## Adopt 3-Ton B Truck Officially

Will Be Used by All the Army Departments for Heavy Duty Hauling

WASHINGTON, June 7—The Quarter-master standardized 3-ton class B truck has been officially adopted as the standardized heavy duty cargo truck for use by the Army in all its departments requiring this capacity truck. This announcement, made by Secretary Baker to-day, marks the first step toward settlement of the controversy on standardized vehicles.

A series of tests for power and fuel consumption was held here secretly three weeks ago to determine which trucks were best. Many commercial makes of trucks competed with the standardized war trucks. The announcement by the War Department emphasizes the quality and superiority of the B truck in comparison with all standard makes of trucks.

It is expected that other announcements will be made in the near future, as to the worthiness of the A and AA types of standardized trucks and standardized motorcycles, which were also tested.

The test reports have not been made public. It is doubtful if they will be. To make public announcement of them would be to give publicity to the inferiorities and superiorities of various private makes of trucks and motorcycles. Reports are coming from authoritative sources, indicating that all three of the standardized war trucks, together with the standardized motorcycle, made excellent showings in every test excepting in one instance, in climbing over a log, a test in which the four-wheel-drive would naturally be expected to be superior.

### Kissel Changes Building Plans

HARTFORD, WIS., June 11—The Kissel Motor Car Co. has changed its plans for the construction of 2 additions to its plant and warehouses, and is erecting a single building, providing considerably more floorspace than the buildings originally planned. An addition to the new building will be erected as soon as conditions warrant it.

### Iowa Has 4363 Tractors

DES MOINES, IOWA, June 11—Iowa farmers now own and operate 4363 tractors, according to figures gathered by the State Department of Agriculture. One thousand Fordsons were sold in Iowa recently in a period covering only a few days.

### Durant Enters Saginaw Iron

SAGINAW, MICH., June 11—W. C. Durant and his associates have taken most of the additional \$250,000 representing the increased capitalization of the Saginaw Malleable Iron Co., which now has a capital stock of \$750,000. The

present capacity of the plant will be doubled upon completion of a new foundry building. Other auxiliary buildings will be erected, and two new furnaces will be added. The present working force of 300 will be doubled, and the daily output of 65 tons of castings will be increased to 130 tons. Almost the entire plant is at present engaged in work for the Ordnance Department, supplying malleable castings for the head and base of the Stokes trench mortar shells which are being assembled at the Marquette plant.

### More Light on Eclipse-Bendix Matter

HOBOKEN, N. J., June 21—We would like to make the following statement with regard to the recent decision of the Examiner of Interferences in the Patent Office on the recent decision in the Eclipse-Bendix starter matter:

First—The decision was that of the Examiner of Interferences, the lowest tribunal in the Patent Office, before whom matters of this sort come, and the case must be tried anew before three higher tribunals which, each in turn, consider the entire matter afresh. All of these appeals will be taken, if necessary, by Joseph Bijur.

Second—These interferences involve many of the Bendix patents, but the Bijur patents, under which Bijur is manufacturing, are not affected. They involve additional Bijur patent applications.

Third—These interferences admittedly cover all the features and improvements which have made the Eclipse-Bendix starter drive a practical and commercial success. On the other hand, although Bendix contends that one of the Bijur devices would infringe these patent claims, Bijur is confident that not a single valid claim in these interferences would be infringed by any of the several forms of Bijur threaded starting devices. None of the Bijur starting devices has either a counter-balance pinion or a spring form of yielding driving connection, or right-angle stops on the threaded shaft to prevent binding of the pinion, or a yielding endwise movement of the screw shaft, or an inboard movement of the pinion, in the form shown in these interferences. The inboard movement broadly is shown in the old Bijur patent with which Bendix was formerly involved in an interference and defeated some years ago.

Fourth—Bendix has had these patent claims, nominally, for years and has never sued Bijur, even for commercial effect.

In brief, these interferences cover all of the features and improvements of the Eclipse-Bendix starter, which make it practical and successful, but no features essential to Bijur, and this decision simply means that of the four times this question must be tried by successively higher tribunals, Bendix has escaped an adverse decision in the first and lowest tribunal.—Joseph Bijur—Bijur Motor Lighting Co.

### Return Loads Meeting in New York

WASHINGTON, June 10—In conjunction with the Highways Transport Committee of the Council of National Defense in Washington, D. C., the Return Loads Bureau organization in New York, Connecticut, Rhode Island, Massachusetts, New Jersey, Pennsylvania and Delaware will hold a 1-day meeting in New York City on June 13 for the purpose of correlating the work of the bureaus in those states.

## Form U.S. Highways Committee

Federal Organization Plans to Co-operate with States to Get Better Highways

WASHINGTON, June 11—The Government Highways Committee has been organized here to co-operate with the various states to obtain better highways. The committee comprises representatives from the War Industries Board, the Fuel Administration, the Railroad Administration, the Highway Transport Committee, the Department of Agriculture and the Motor Transport Service of the U. S. Army.

Logan Waller Page, director of the Public Roads Office of the Department of Agriculture, will head the new committee, Roy D. Chapin will represent the Highways Transport Committee and Lieut.-Col. W. D. Uhler will represent the Army. Others will be appointed later this week. The members of this committee, it is expected, will clarify many difficulties. The Fuel Administration will pass upon asphalt for example, the War Industries Board on cement, stones, etc., the Railroad Administration on transportation, the Office of Public Roads and the Highways Transport Committee on necessary commercial highways, and the Motor Transport Service on the military highways. The committee is now in a tentative form. A meeting will be held Wednesday, June 12, at which time the complete committee will be organized and its business defined.

### Employment Managers Organize

NEW YORK, June 12—The employment managers of the country who for some time have been grouped together in local organizations have effected the organization of a national body known as the National Assn. of Employment Managers. The executive committee of this national body recently met in Washington and attended to the preliminary details of organization. It is planned to maintain an office with a secretary in charge in Washington for the duration of the war at least.

About a dozen local employment managers' associations are represented in the national body.

### Paige Increases Capacity

DETROIT, June 11—The Paige-Detroit Motor Car Co. has moved into the last of four new buildings recently erected for the company. This adds 66,000 sq. ft. to the company's floorspace.

### 5,304 Miles Covered by Air Mail

WASHINGTON, June 13—According to the Post Office Department, the aggregate flying distance covered by the air mail service between New York and Washington during the second half of May was 5,304 miles, and the average rate of speed, 68 m.p.h.



## AUTOMOTIVE MATERIALS MARKETS

## Material Market Prices

<b>Acid:</b>		Brown crepe, thin, clear. .60
Muriatic (22°).....	.025%	Smoked, ribbed, sheets.. .62
Phosphoric.....	.26	<b>Para:</b>
Sulphuric (60°).....	.13	Up River, fine..... .68
<b>Aluminum.....</b>	.33	Up River, coarse..... .40
<b>Copper:</b>		Island, fine..... .59
Elec.....	.23½	Island, coarse..... .27
Lake.....	.23½	Caucho ball, upper..... .40
<b>Lead.....</b>	.07½	Caucho ball, lower..... .36
<b>Oil:</b>		<b>Solder:</b>
Gasoline (see special table).		Half and half..... .70
Lard.....	1.42-1.80	No. 1..... .63
Linseed.....	1.56	Refined..... .50
Menhaden.....	1.10-1.24	<b>Steel:</b>
Petroleum.....		Angle beams and chan'ls .03
Kansas.....	2.25	Automobile sheet (see sp. tab.)
Pennsylvania.....	4.00	Cold rolled..... .06½
		Hot Rolled..... .03½
<b>RUBBER</b>		<b>White Lead:</b>
<b>Ceylon:</b>		Basic Carbonate..... .12¾
First latex, pale crepe.....	.63	Basic Sulphate..... .08¾

## AUTOMOBILE SHEET PRICES

(Based on No. 22 Gage. Other gages at usual differentials)

	Primes only. Per 100 lb.	Primes when seconds up to 15 per cent are taken. Per 100 lb.	Seconds arising. *See Note
Automobile body stock.....	\$5.95	\$5.85	
Automobile body stock, deep stamping.	6.20	6.10	
Automobile body stock, extra deep stamping.....	6.45	6.35	
Hood, flat fender, door and apron, or splash guard stock.....	6.05	5.95	
Crown fender, cowl and radiator casing, deep stamping.....	6.30	6.20	
Crown fender, cowl and radiator casing, extra deep stamping.....	6.55	6.45	
Automobile Sheet Extras for Extreme Widths:			
Nos. 17 and 18 over 36 in. to 44 in., 10c. per 100 lb.			
Nos. 19 to 21 over 36 in. to 44 in., 30c. per 100 lb.			
Nos. 22 to 24 over 36 in. to 40 in., 40c. per 100 lb.			
Nos. 22 to 24 over 40 in. to 44 in., 80c. per 100 lb.			
Black sheet extras to apply on narrow widths.			
Oiling, 10c. per 100 lb.			
Patent leveling, 25c. per 100 lb.			
Resquaring, 5 per cent of gage price after quality, finish and size extras have been added.			

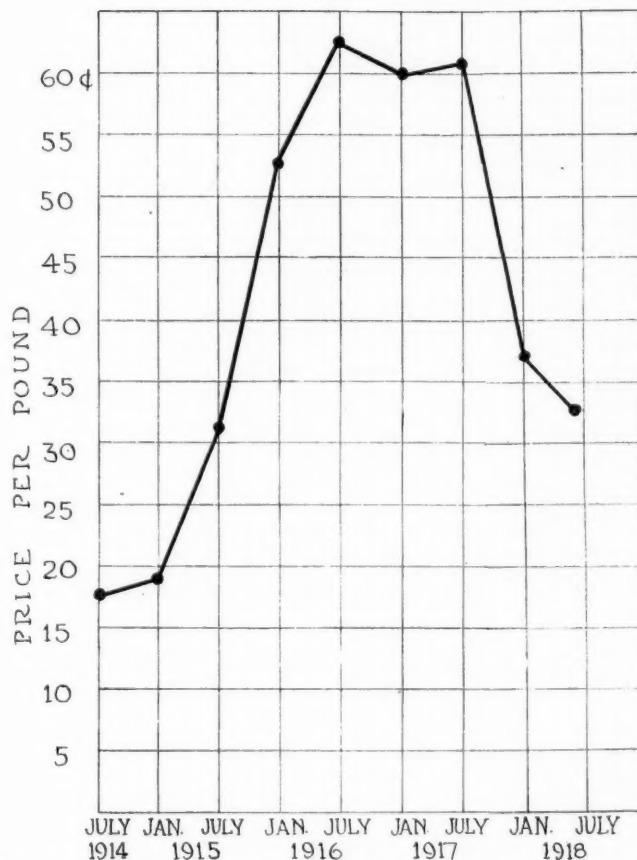
\*Ten per cent less than the invoice Pittsburgh price for corresponding primes.

## Current Gasoline Prices

Wholesale gasoline prices as of June 12, 1918, obtained by the Oil Trade Journal from refining, marketing and jobbing concerns in the various cities following (in cents per gallon):

Albany, N. Y.....	25	Jackson, Mich.....	24.5
Albion, N. Y.....	25-26	Jacksonville, Fla.....	24
Atchison, Kan.....	20.7	Jeffersonville, Ind.....	23.5
Atlanta, Ga.....	26	Jersey City, N. J.....	22
Augusta, Ga.....	26	Kansas City, Mo.....	21.9
Baltimore, Md.....	22	Kirkville, Mo.....	22.6
Binghamton, N. Y.....	25	Little Rock, Ark.....	24.5
Boston, Mass.....	25	Louisville, Ky.....	25
Braymer, Mo.....	20.7	Macon, Ga.....	26
Bridgeport, Conn.....	23	Marshalltown, Ia.....	22.5
Brooklyn, N. Y.....	24	Minneapolis, Minn.....	23.5
Buffalo, N. Y.....	23-24	Milwaukee, Wis.....	22.6
Camden, N. J.....	22	Montgomery, Ala.....	26
Charleston, S. C.....	25.5	Muskogee, Okla.....	23
Chicago, Ill.....	22.5	New Haven, Conn.....	24
Cleveland, O.....	23	New Orleans, La.....	22
Columbus, O.....	23-24	Newark, N. J.....	21.5
Dallas, Tex.....	25	New York City.....	24
Denver, Col.....	24	Overland, Kan.....	21
Des Moines, Ia.....	22.5	Omaha, Neb.....	22.5
Detroit, Mich.....	23	Paterson, N. J.....	22
Elizabeth, N. J.....	22	Pawtucket, R. I.....	25
Erie, Pa.....	*29	Philadelphia, Pa.....	*28
Evansville, Ind.....	22.5	Pittsburgh, Pa.....	*28
Ft. Wayne, Ind.....	21.5-22.5	Portland, Me.....	25
Ft. Worth, Tex.....	25	Providence, R. I.....	25
Gloucester, Mass.....	25	Pueblo, Col.....	24
Grand Rapids, Mich.....	23	Raleigh, N. C.....	23.5
Great Bend, Kan.....	20.8	Richmond, Va.....	22.5
Hartford, Conn.....	24	Rockford, Ill.....	22.5
Houston, Tex.....	26	St. Louis, Mo.....	21.9
Independence, Kan.....	20.4	St. Paul, Minn.....	23.5
Indianapolis, Ind.....	21-24	Salem, Mass.....	25
		Salina, Kan.....	28
		Salt Lake City, Utah.....	26
		Savannah, Ga.....	25

\*Open market price, 10 per cent discount to garages.



Variations in the price of aluminum during the past 4 years

Schenectady, N. Y.....	25	Trinidad, Col.....	24
Scott City, Kan.....	21	Troy, N. Y.....	25
Shreveport, La.....	23	Tucumcari, N. M.....	24.5
Spokane, Wash.....	22.5	Vicksburg, Miss.....	24.5
South Bend, Ind.....	22.5	Washington, D. C.....	22
Tampa, Fla.....	24	Wichita, Kan.....	20.7
Toledo, O.....	23-24	Wilmington, Del.....	23
Topeka, Kan.....	20.7		

## Pacific Coast Gasoline Prices

Gasoline prices obtained through the Independent Petroleum Markets Association and the Garagemen's Association of California (in cents per gallon):

San Diego, Cal.....	18.5	Portland.....	18.5
Los Angeles.....	18	Tacoma, Wash.....	18.5
Fresno.....	18.5	Olympia.....	20.5
San Francisco.....	18	Spokane.....	21.5
Sacramento.....	18.5	Seattle.....	18.5
Astoria, Ore.....	18.5-20	Walla Walla.....	22
Salem.....	19.5		

Note—The Pacific coast gasoline table is given separately as the marketing arrangement differs from that in the East and Middle West. The only published figures on the Pacific are the retail prices as named by service stations. These are pretty uniform as regards the large marketers, but the price at which the dealer buys gasoline is not so uniform. While some companies maintain a definite figure of 2 cents per gallon under the market price to garages, a few allow larger differentials.

## Cuts Chrome Imports to Save Ships

WASHINGTON, June 12.—Under the general policy of tonnage conservation, the War Trade Board has introduced restrictions upon the importation of chrome ore and chromite from overseas, in a new ruling announced to-day. The sources of home supply are numerous and are believed to be capable of extensive development. To provide for demands pending the development of such deposits limited imports will be permitted.

## Statewide Return Loads Bureaus Needed, Highways Transport Committee Says

22 States Represented at Meeting—Use of Trucks in Overland Hauls from Colorado Mines Explained—Rural Express Urged

WASHINGTON, D. C., June 7—The 2-day get-together meeting of the representatives of the Highways Transport Committees of twenty-three State Councils of Defense with the parent Highways Transport Committee here in Washington was the greatest step forward yet made by that committee to spread to the country at large the necessity of the formation of statewide Return Loads Bureaus and the establishment of rural motor truck express routes. Delegates were present from the far off State of Colorado, where motor trucks are to-day performing a wonderful service in long overland hauls from mines from which vitally necessary war materials are being dug. The other twenty-one states represented were Alabama, Connecticut, Delaware, Illinois, Indiana, Kentucky, Maryland, Massachusetts, Michigan, Missouri, New York, New Jersey, North Carolina, Ohio, Pennsylvania, Rhode Island, Tennessee, Texas, Virginia, Wisconsin, West Virginia, as well as the District of Columbia.

The three main topics were Return Loads Bureaus, Rural Motor Truck Express Routes and Good Roads. Roy D. Chapin, chairman of the Highways Transport Committee of the Council of National Defense, presided at the conference.

### Necessity for Intensive Truck Use

The imminent necessity for organizing and using the motor trucks of the country at their highest efficiency in order to relieve the railroads of their short-haul traffic and to keep the farmer at actual food production work on his farm by means of supplying him reliable transportation to and from his city's markets was driven home by the various speakers, who included representatives of the Railroad, Food and Labor administrations and others who have been closely identified with the work in various parts of the country.

W. S. Gifford, Director of the Council of National Defense, in a short talk urged that highway transportation be increased to the greatest possible extent in order that there be no weakness in that trilogy of transportation means consisting of the railways, waterways and highways.

The actual work which the Return Loads Bureaus already established have accomplished was outlined by D. C. Fenner, of the New York City Return Loads Bureau; by David Harper and J. F. Winchester, respectively president and secretary of the Motor Truck Club of New Jersey, which is operating the Return Loads Bureau in Newark, and by Charles J. Bennett, Connecticut State Highway Commissioner.

The necessity for the establishment of Rural Express Routes was outlined by

F. C. Marquis, the member of the parent Highways Transport Committee in charge of the rural express work. The United States Food Administration has been so impressed with the possibilities of motor trucks to increase food production that it has given definite orders to all of its local food administrators to assist in every way in its power to establish rural express lines.

### Value of Rural Express Routes

C. T. Clayton, of the United States Department of Labor, was of the opinion that the establishment of necessary rural express routes in localities where it is now possible for them to operate would be equivalent to putting more than 100,000 of the very best type of farmers into actual production on the farms of the country. The placing of this large number of men in actual production work would be effected by providing the necessary transportation so that they would not have to drive their own loads to market and be absent from the farms for the length of the trips into the various cities.

If this number of men could be saved for actual food production it would go a long way toward solving the present shortage of farm labor, which is estimated at approximately 24 per cent of the total farm labor supply, although it is thought that the same or a larger production than last year could be made possible by an increase of only 12 per cent instead of 24 per cent.

The work which the National Automobile Chamber of Commerce is doing toward the extension of rural motor express routes was outlined by S. A. Miles, who told of the appointment of district agents in twenty-eight of the leading cities in the country to carry on the work personally and through the medium of booklets issued by the chamber and by newspaper and other publicity.

It was brought out that good roads are a necessity for the development of both Return Loads Bureaus and Rural Express Routes. The thought that while we all want to see good motor truck highways, but that these cannot be built in a day or even during the period of the war, was well expressed by George H. Pride, a member of the Highways Transport Committee, who pointed out that we must make the best possible use of what highways we now have.

If we cannot have 365-days-in-a-year highways, it is better to have 180-days highways or even 90-days or 30-days highways.

The entire road program has taken on a more optimistic color since the removal of the famous priority order No. 2, which prohibited the shipment of all highway materials by railroad, and the situation appears to become brighter due

to the fact that the Council of National Defense is now working upon a Federal road policy which it is expected will be promulgated during the course of the next few weeks.

David L. Ludlum, president of the Autocar Co., Ardmore, Pa., presented a resolution to the Council of National Defense urging upon it the adoption of such a policy. The resolution was unanimously adopted by the representatives at the meeting and will be presented to the council by the Highways Transport Committee.

### Fordson Wins All-England Championship

DEARBORN, MICH., June 10—The Fordson tractor serial number F 69 has won the All-England championship for the period ending April 6, according to a telegram received by F. Myers, tractor representative for Henry Ford & Son in Holland County, England. This is despite the fact that the tractor lost 5 days due to the fact that the competition for the tractors started before the Fordson arrived. The tractors worked on 4 separate farms. During the 3 weeks and 2 days it was in commission the tractor plowed, cultivated, etc., 470½ acres, and the amount earned was £142 18s. The paraffin consumption was 2 6/7 gal. per acre. The tractor was worked by two soldiers trained in the county, and who, previous to this, had no experience in the working of tractors. They worked 12 hours a day, including Sunday. The championship shield received by the men bears the inscription, "National Food Campaign Champion Tractor of England and Wales." The championship shield will be held for 1 month.

### Platinum Controlled by Germans

WASHINGTON, June 8—The platinum industry of the United States has been controlled by Germany since the declaration of war, according to the report of Representative Rainey of Illinois before the House of Representatives yesterday. Congressman Rainey said that 80 per cent of the platinum business in this country is controlled by Baker & Co., New York; the American Platinum Works, the Irvington Smelting & Refining Co. of New Jersey, and Charles Englehard of New York. All of these firms, he declared, were controlled absolutely by Englehard. He charged Englehard as being a representative of German platinum interests in this country, who, while acting for the platinum firm of W. C. Heraeus of Hanau, Germany, had also been an adviser of the War Industries Board on platinum matters.

Congressman Rainey also claimed in his speech that the Jewelers' Vigilance Committee had attempted to defeat legislation designed to stop the use of platinum in jewelry manufacture by advertisements and other means. He pointed out the vast needs of platinum for airplanes, and pledged himself to see to it that the new revenue bill should contain a tax upon the use of platinum for jewelers which would be practically prohibitive.



## National Trade-Marks Opposed

Members of American Chamber of Commerce in London Fear Trade Will Be Harmed

LONDON, ENGLAND, May 28—Much anxiety has been expressed by members of the American Chamber of Commerce here concerning the bill, recently introduced in the House of Representatives by Congressman Sims, providing for a distinctive national trade-mark, under government license, to be attached to goods of American origin.

The criticism of the bill by Americans is based entirely on the reading of the bill, and is aimed against the principle of national trade-marks, which must be applied indiscriminately to American exports. They believe that American manufacturers are able to establish the pre-eminence of their products under their own marks of identification, and will be little interested in an "omnibus" trade-mark maintained by the government to carry reputable or disreputable goods.

The American Chamber of Commerce in London has a membership of over 600, including representatives of most important American concerns engaged in commerce with Great Britain. Its members fear that legislation along the lines of the above bill necessarily carries dangerous possibilities, demanding great caution and elaborate safeguards to protect American export trade interests in European markets. It is the current opinion of members that any common official mark is dangerous to export trade unless it is absolutely restricted to a standardized quality of goods only. Such restriction is believed to be impractical and impossible of efficient application. Furthermore, they believe that goods sold to the general public in the British and other commercially developed European markets would in no way be benefited by a displayed mark of foreign origin.

Representatives of American trade interests in Great Britain have expressed their hope that any proposed legislation dealing with this important matter will be closely scrutinized by all seriously interested in the welfare of American export trade.

### Reo Production 90 Vehicles Daily

LANSING, June 10—The Reo Motor Car Co. is turning out about 90 vehicles per day, of which 35 per cent are trucks. Within 30 days the company expects to be turning out its government order for creeper-type tractors.

### Train Mechanics in Public School

WORCESTER, MASS., June 11—The Worcester Trade School, which is a public school maintained by this city, is now planning the organization of a summer school for the training of tool makers, pattern makers, expert machinists and skilled mechanics of the higher grade.

The school is enlisting the co-operation of several of the larger manufacturing plants of Worcester with the idea that these plants shall furnish the men to be trained from among their employees, and that they shall pay the wages of the men during training and the salaries of the instructors.

The plants will also be expected to provide regular production work to be used in the training, while the school will provide the equipment and supervise the work of instruction.

### Potter Made Assistant Director of Aircraft Production

WASHINGTON, June 7—William C. Potter, chief of the Equipment Division of the Signal Corps, has been made assistant director of aircraft production under John D. Ryan, director of the Bureau of Aircraft Production.

All departments of this bureau and those of the Department of Military Aeronautics will be located in a new building at Fourth and Missouri avenues. The executive departments, including personnel and planning, the departments of the division of production, including the plane, engine, ordnance, instruments, accessories, balloon and inspection divisions, and the production engineering department, all originally a part of the Equipment Division of the Signal Corps, moved to-day to the new building.

### Auto Safety Light Moves

KANSAS CITY, June 11—The Auto Safety Light Co. has moved its offices from this city to Detroit. The new plant is located at 41 East Willis Street.

## Supplies Carried by Tractor Train

Materials Needed by Automotive Manufacturers Carried on Detroit-Toledo Trips

DETROIT, June 8—A tractor train consisting of a Walter tractor and two 5-ton trailers is operating on a regular schedule between Detroit and Toledo, two trains leaving each city daily. On account of a detour that has to be made near Monroe due to the construction of the road the trips now consume 9 hr. After the road is completed it is expected that the running time will be cut down considerably. It is claimed by the company that these tractor trains are less harmful to road surfaces than loaded 5-ton trucks because of the even distribution of weight.

Owing to the critical steel situation the trains have had little to carry on the trips to Detroit, but capacity loads have always left from this city to Toledo. Nearly everything carried pertains to the automotive industry, motors, springs, bearings, etc. By fall the company operating the tractors expects to extend its operations to Cleveland, Canton, Akron and Alliance.

The officers are: President, Jesse D. Hurlbut, who is also treasurer of the Toledo Grain & Milling Co.; vice-president and general manager, Frank C. Schmidt, president and treasurer of the Frank C. Schmidt Realty Co., and secretary, Frank L. Baird. The company has leased 3610 Detroit Avenue.



This train of tractors and trailers, loaded with rims carrying a capacity load of 104,000 lb., recently made a trip from Cleveland to Toledo, and now makes regular scheduled runs

## Automobiles Scarce in Australia

Few Shipments Received Lately and Dealers Are Stockless—Used Cars Valuable

SYDNEY, AUSTRALIA, May 7—The general dearth of automobiles in the southern part of Australia continues, and few shipments have arrived recently. One or two American makers have made heavy shipments to Adelaide and Melbourne, but with these exceptions, there is an absolute lack of cars. Australian dealers are booked for months to come.

Used cars of well-known and popular makes are commanding high prices. One of the results of the war is that persons who formerly left Australia for their vacations are now spending their time touring the Commonwealth. Roads which were seldom used have been rolled down by motor traffic. A part of southern Australia known as the Coorong was almost unfrequented before the war. Recently it was noted that eight touring parties passed through it in one day.

In the northwestern parts of New South Wales the land was hitherto considered sandy desert and uninhabitable. As long as rich lands nearer the coast were available, little attention was paid to this part of the country. With the increase of motor traffic to the interior parts, it was found that this land was rich soil, consisting of sediment from floods, and sprinkled over with sand blown there during the periodic storms.

The land in Australia is held in large sections called cattle stations. Some of these are more than 100 square miles, and outhouses must be established for communication purposes. Formerly horses and camels were used to carry workers, inspectors, and supplies from one outhouse to another, and from and to the towns. This work is now done almost entirely by motor cars and trucks.

Owing to the nature of the country, the life of a car is limited. Sand and dust enter the carburetor to such an extent that after about 3000 miles of running the valves and cages are ground away, and there is scarcely any compression in the engine. This occurs in every make of car used here.

The River Darling runs through the northwestern part of New South Wales, and this is only navigable part of the year. When the river is low, cars are stripped of their bodies, and are fitted with an open tray. This is loaded with supplies, and sometimes carry them 250 miles. These trips are made every few weeks, and necessitate a steady increase in motor car development. Everywhere, however, the need of an air cleaning system, such as is used on farm tractors, is felt.

Farm tractors are at present viewed with suspicion by inhabitants of the country. Dealers, however, believe that they will eventually be popular. A re-

duction in the price of gasoline, and the simplifying of tractors, which farmers now believe to be horribly complicated implements, will help to increase their use.

### Almost All Liberty Planes Come from Detroit

DETROIT, June 11—Detroit is producing 92½ per cent of all Liberty engines contracted for and at least one-third of the battle plane supply, according to a statement issued by the Detroit Real Estate Board. It is estimated that 19,000 Liberty engines will be completed in Detroit before Sept. 1, the contract time. It is also estimated that within 4 months Detroit will be producing not less than 50 complete battle planes daily. Automobile manufacturers are gradually working into a state of complete war production in view of the edict that steel is to be issued only to war industries.

### Templeton Director of Industrial District

DETROIT, June 11—Allan A. Templeton, former president of the Detroit Board of Commerce, and president of the Detroit Seamless Steel Tubes Co., has been made director of the Detroit industrial zone. He will have general supervision of the production of war materials in this zone. Detroit is the center of one of the 20 zones into which the United States has been divided by the War Industries Board, for the purpose of facilitating the manufacture of munitions. The limits of the Detroit zone have not been announced.

### Gasoline Tax Rumors Untrue

WASHINGTON, June 12—Reports that a high tax on gasoline used for passenger cars and motor trucks will be placed in effect in July or August, 1918, are untrue. These reports, published by papers throughout the country, are the result of a speech made in Congress advocating such a tax. There has been no bill prepared for it. Even if this tax were to be placed in effect, it would be incorporated in the new proposed taxes now being discussed by the Ways and Means Committee, and these will probably not be put in a concrete form and passed by Congress for several months.

### Rader Killed in Airplane Accident

BUFFALO, June 10—Philip Rader, one of the best Curtiss fliers, and who for 2 years has been a Curtiss instructor at its different flying fields, was killed to-day while flying in a Bristol plane during a visit at the Curtiss plant of John F. Ryan, chairman of the Aircraft Board. Rader came from the Royal Flying Corps in England more than two years ago. The accident was due to a portion of the linen coming off the plane while Rader was making a glide from 2000 ft. level to 500 ft. When reaching the 500 ft. level the linen apparently blew across Rader's face obstructing his vision and preventing him from making a perfect landing. He struck the ground in a nose dive.

## May Rubber Imports Off Slightly

Tonnage Drops 2123 as Compared With Last May—Five Months Figures Higher

NEW YORK, June 12—Imports of crude rubber fell off 2123 tons during the month of May, the total imports being 16,288 tons as against 18,411 tons during May, 1917. Although the War Trade Board has limited importations of rubber to 25,000 tons during the 3 months' period starting May 6 and ending July 31, a large percentage of the rubber which came in during May was shipped prior to May 8 and thus comes under the heading of free rubber. In other words it is still possible for nearly the entire 25,000 tons to be brought in during June and July if ships can be obtained. It is understood that tire makers have at present fairly adequate stocks to carry them through the curtailment period.

During the first 5 months of 1918 there was imported a total of 75,344 tons of crude rubber, which is 2359 tons more than the corresponding period in 1917, when 72,985 tons came in. The total importation during the entire year of 1917 was 167,062 tons, and according to the order of the War Trade Board imports during 1918 are to be limited to 100,000 tons. Following are the statistics as compiled by the Rubber Association of America:

Month	1917, Tons	1918, Tons
January	12,788	16,084
February	10,162	13,108
March	18,624	17,161
April	13,000	12,703
May	18,411	16,288
Total	72,985	75,344

### Doehler Die Casting Plant Enlarged

TOLEDO, June 11—The Doehler Die Casting Co. is expanding its plant to handle government contracts on an enlarged scale. A 2-story building, leased from the Ohio Electric Car Co., will be used for making rifle and hand grenades, machine gun, gas mask and depth bomb parts, and airplane equipment. The Ohio Electric Car Co. has discontinued production, having been classified as a non-essential industry. It is expected that the Doehler company will soon take over a second Ohio Electric building.

### Falls Motors Working 22 Hours

SHEBOYGAN FALLS, WIS., June 10—The Falls Motors Corp., which is devoting almost all its capacity to governmental orders, has rearranged its working schedule so that the plant is in operation 22 hours a day. Formerly the regular day shift was supplemented by an extra shift working from 3 p. m. to 11 p. m., but now a force equal to the day force is employed from 6 p. m. to 6 a. m.



## Manufacturers Plan to Organize

### Desirability of More Inclusive and Representative Body Expressed at Meeting

ATLANTIC CITY, N. J., June 12—At a convention of manufacturers of Pennsylvania, New York, New Jersey, Delaware, Connecticut and Massachusetts, which was called by the Manufacturers Council of New Jersey, the desirability of a more inclusive and representative organization of manufacturers in the United States was expressed by Warren C. King, president of the New Jersey Council, who said:

"There are over 300,000 manufacturing establishments in the United States, giving employment to approximately 10,000,000 workers. There is no organization in the United States to-day which is truly representative of all the manufacturers of this country. The National Association of Manufacturers has a membership less than 1½ per cent of the 300,000 as members.

"There are numerous State associations, but they are not welded together. There are national associations of particular industries, but there is no central organization. At the present time it is impossible to register accurately the opinion of the manufacturers of this country on any national question, yet the manufacturers have been the football of tariff and taxation legislation for the past half century, and the only chance they have had to show their feelings has been at the polls on Election Day."

The fundamental details of the organization of such a federation were agreed upon at the convention which was attended by representatives of upward of 30,000 plants, approximately a tenth of all those upon which the Government depends for its supplies. The output of the industries represented by the six states from which the manufacturers attending came is said to be approximately a third of the industrial production of the nation.

#### Highway Committee Changed

WASHINGTON, D. C., June 12—The Government Highways Committee met to-day and changed its name to the United States Highways Council. The following were appointed representatives of the various divisions of the council: R. L. Humphrey for the War Industries Board, B. G. Sheffield for the Fuel Administration, G. B. Clifton for the Railroad Administration, Logan Waller Page for the Department of Agriculture, Lt. Col. W. D. Uhler for the Army, and J. E. Pennypacker, as chairman.

#### Cox Would Tax Cars

WASHINGTON, D. C., June 12—With the thought of getting more revenue out of the passenger automobile, several bills have been brought before Congress and

numerous suggestions made by Congressmen. At present Congressman Cox seems to have the attention of Chairman Claude Kitchin of the Ways and Means Committee, and also, according to Alfred Reeves, has the approval of the automobile manufacturers. This bill calls for a tax of \$5 on a motorcycle annually, and \$1 annually on a \$500 passenger car, \$30 on a \$1,000 car and \$20 for each \$500 increase from \$1,000 to \$3,000 and \$30 increase per \$500 for over \$3,000. The tax is to be reduced 10 per cent for each year that the car is owned, but in no instance to less than 50 per cent.

#### Louisville Stops Sunday Service

LOUISVILLE, June 12—The Louisville Automobile Dealers' Assn. has lined up with the War Economy Board of the Council of National Defense and has adopted resolutions similar to those adopted by the War Service Committee of the National Automobile Dealers' Assn. Night and Sunday service will be curtailed on June 15; stockrooms will be closed, and no parts supplied or sold; salesrooms will be closed on Sunday, and salesmen will not make any demonstrations.

#### Wisconsin Works for Sunday Closing

MILWAUKEE, June 11—More than 200 individuals and organizations of Wisconsin adopted and ratified the decision of the Economy Board of the National Automobile Dealers' Assn. to close all garages, service stations and accessory stores at 6 p. m. daily and on Sundays and holidays at a meeting last week. Other members of the industry are signing ratification cards, and it is expected that every one will follow the new regulations within a short time.

#### Chicago Dealers Adopt Closing Orders

CHICAGO, June 8—Chicago motor car dealers at a meeting yesterday unanimously adopted the recommendations of the War Economy Board at Washington regarding service during the continuance of the war. The action of the Chicago dealers was in line with the resolution adopted at the meeting of the board of directors of the N. A. D. A. at St. Louis, May 17 and 18, when dealers everywhere were called upon to enforce the recommendations of the War Economy Board.

#### Garbed Tests Approaching

WASHINGTON, June 10—G. T. K. Giragossian, inventor of Garbed, a mysterious natural force, telegraphed the Department of Interior to-day: "My work excellent, can write definitely Wednesday." Members of the Scientific Test Board appointed under Congressional resolution have received word to be ready for the exhibitions.

#### Ford Absences Reduced

DETROIT, June 11—The percentage of absentees at the Ford Motor Co. has been reduced 20 per cent during May. It is believed that prohibition in Michigan has contributed to this result.

## Oppose Separate Tax for Trucks

### George Graham, Chairman of Truck Committee N. A. C. C. Says It Is Wrong

WASHINGTON, D. C., June 13—George Graham, chairman of the motor truck committee of the National Automobile Chamber of Commerce, in his address before the Ways and Means Committee on the hearing regarding the 3 per cent tax on truck manufacturers, stated that he was talking for 100 per cent of the truck industry and not merely for N. A. C. C. members, and that they have no intimation of the attitude of the Ways and Means Committee towards the taxing of trucks, that the truck makers do not object to the tax, but it is the principle of the matter that if they are going to tax luxuries as requested by President Wilson they should leave out trucks, which are solely utilitarian.

He said further that yesterday the Ways and Means Committee discussed the curtailment of passenger cars by a high tax and the differences of opinion on the utility of passenger cars, and he requested that trucks be considered separately because they are 100 per cent utilitarian.

He told of the transportation problems of last winter and that trucks replaced the labor of from three to four men and saved 5 acres of land for each horse eliminated from service. He spoke further of the work they are doing in the way of Return Loads and augmented railroads and told of the approval of the Department of Agriculture, Department of Labor, and other government departments, on the use of motor trucks. He told of the creation of the Highway Transports Committee as proof of the Government's recognition of motor trucks.

He said about 275,000 motor trucks will be made this year according to the production of the first 3 months, 50,000 of which will go to France; 40,000 of which will replace used trucks, making 585,000 trucks in the United States with capacities from ½-ton to 10-ton including the use of trailers.

#### Garfield Denies Fuel Curtailment

(Continued from page 1145)

ice plants will yield a still larger tonnage, unnecessary outdoor lighting, including advertising signs will be reduced. Hotels, office buildings, apartment buildings and public buildings are being asked to join in rigid economy of light and heat. Instructions for cleaning domestic furnaces are being prepared for every citizen. The Fuel Administration estimates that it will be possible to save from 50,000,000 to 75,000,000 tons of coal through these methods without serious inconvenience to the public, and with a lesser curtailment resulting of the non-war industries.

## Oakland Employees Form a War Savings Society

PONTIAC, MICH, June 10—The employees of the Oakland Motor Car Co. have pledged themselves to buy \$1,000 worth of Thrift Stamps every pay day. This means that the government will receive from this plant a sum somewhat in excess of \$24,000 annually.

At a production meeting held at the plant on May 20 it was decided to organize a war savings society. Fred Warner, general manager of the plant, advocated a systematic method of loaning money to the government. Two men from the local war savings committee also gave talks along this line. As a result of this meeting the Oakland Motor Car Co. War Savings Society was formed with Fred W. Hanneman as president. The foremen of all departments are designated vice-presidents.

Posters with the heading "Save Thrift Stamps and Thrift Stamps Will Save You" were put up promptly in conspicuous places in the plant and each foreman was supplied with pledge cards with instruction to approach every man in his department and find out what amount he would authorize the company to take out of his pay envelope each pay day and substitute Thrift Stamps. Not one employee in the entire factory failed to subscribe.

A similar campaign will be inaugurated in the newly acquired Northway-Oakland plant which will swell the subscription for Thrift Stamps considerably. It is expected that employees of this plant will also subscribe 100 per cent.

### Martin Fifth Wheel Grants Manufacture Licenses

SPRINGFIELD, MASS., June 10—The Martin Rocking Fifth Wheel Co., which controls several patents on tractors with semi-trailer combinations and fifth wheels, has recently granted licenses under its patent covering "the truck and semi-trailer with rocking connection" to the following manufacturers: Watson Wagon Co., King Trailer Co., Highway Trailer Co. and the United Truck Co. These licenses, with the exception of the one to the United Truck Co., do not include the patents covering the attaching and detaching features or the spring shock absorbing features.

## SAVE THRIFT STAMPS AND THRIFT STAMPS WILL SAVE YOU

THE OAKLAND MOTOR CAR COMPANY WAR SAVING SOCIETY has been organized for every Oakland Employee, so that all may systematically SAVE and lend money to our Government to win the war and win it SOON.

Every employee in this factory should join this society.

Every time you buy a Thrift Stamp you are helping to win the war—you help to stimulate the courage and spirit of our boys in France.

We who are enjoying the peace and safety of our homes can do no less than firmly support the boys who are facing the bitter struggle which they must face tonight, and tomorrow night and every night until the FINAL VICTORY is won.

Let us buy and keep on buying Thrift Stamps and War Saving Certificate Stamps until OLD GLORY is tacked to the palace flag pole in Berlin.

Application for membership in this Society can be made to your Foreman or Department Head.

Ask your foreman for an application form and sign it TODAY. Subscribe for all you can afford to buy. There is no fixed limit to the amount you can buy. The more stamps you buy, the more money you save, and greater your support to our boys at the front.

*The poster used in the Oakland plant  
encouraging employees to buy Thrift  
Stamps*

## EMPLOYEES Special Notice

Many of our employees have already left us to join the colors—no doubt, many more will have to go. To fill these vacancies it will be necessary to employ many women.

This company has, therefore, decided that in the employing of women, it is only fair to give first consideration to the dependents of those who have left our employ to enter the service of our government.

In order that we may carry out this policy, we ask your co-operation to the end that you register with us the names of any women who, in your opinion, would want employment and who would be entitled to consideration under the above policy.

Our Employment Department will receive all such registrations and we will be glad of the opportunity to give these dependents first consideration, qualifications considered, in the filling of any vacancies.

*In employing women, the Oakland  
Co. will give first consideration to de-  
pendents of men joining the colors*

Dept.

## Oakland Motor Car Co.'s WAR SAVING SOCIETY

I am glad to do all that I can to help my country during this crisis, and appreciating the benefit to myself of systematic saving, I authorize the Oakland Motor Car Company to deduct the amount stated below from each pay for the purchase of WAR SAVINGS STAMPS, which are to be delivered to me.

Clock No..... Signature.....  
Amount.....

*A copy of the pledge card authorizing the company to deduct a certain amount from each pay of the employee whose signature appears thereon, Thrift Stamps equal to the amount of the deduction to be placed in the envelope*

## Government to Take Over Recruiting of War Labor

WASHINGTON, June 8—The United States Employment Service, developed under the Department of Labor, has now reached the stage where it is equipped to take over entirely the work of recruiting and developing labor for all kinds of war production. It is expected that orders will soon be issued by the government to employers with war contracts that they must cease independent labor recruiting and obtain their workers through the government employment service exclusively.

The employment service can secure the employer against a loss of valuable men through competitive labor recruiting, and will reduce labor turnover. It will increase the available common labor supply to-day. Much unskilled labor is being rushed from place to place at present as a result of competition. The service also anticipates that it will handle the work of transferring men engaged in non-war industries to war industries.

There are now 350 officers of this employment service in a chain from coast to coast, and in addition there are 20,000 local agents. A system of labor clearances has been established so that with an hour's notice labor can be recruited and transferred from one district to another. The employment service is placing 6000 workers a day in ship yards, munitions plants and other war industries.

Approximately 45,000 women were placed in employment by the United States Employment Service during the last 4 months. Following are the figures:

January .....	9,668
February .....	8,447
March .....	11,118
April .....	15,756
Total .....	44,989

### Name Director of Oil Conservation

BALTIMORE, June 9—Champlin Robinson, head of the William C. Robinson & Sons Co. and the Robinson Oil Corp., has been appointed Director of Oil Conservation for the United States. He will work with the Fuel Administration.

### N. A. A. J. Delegates Arrive

HOT SPRINGS, VA., June 9—Despite the fact that there are only committee meetings scheduled for his week, many men have already arrived to attend the convention of the National Assn. of Automobile Accessory Jobbers. The general session will begin next Monday.

### Marvel Accessories Office Moved

CLEVELAND, June 9—The office of the Marvel Accessories Mfg. Co. has been moved from Seventy-third Street and St. Clair Avenue to 2011 East Forty-sixth Street. The new quarters will give increased capacity.



## Pike Made Manager of Paige Truck Division

Charles S. Pike has been appointed sales manager of the new truck division of the Paige-Detroit Motor Car Co. He came to the company from the Burroughs Adding Machine Co., Detroit, 2 years ago to take charge of sales promotion of passenger cars when a department for this work was organized.

W. E. Hutchison has been appointed manager of purchases of the Denby Motor Truck Co., Detroit, succeeding E. F. Oberlin, who is in government service. Mr. Hutchison was formerly purchasing agent for the United States Ball Bearing Co., Chicago.

F. X. Devlin, formerly purchasing agent of the Federal Motor Truck Co., and later purchasing agent of the Elgin Motor Car Co., has been appointed purchasing agent of the Standard Motor Truck Co., Detroit.

C. M. Waltman has joined the Hupp Motor Car Corp., Detroit, as assistant to the vice-president in charge of production. He was formerly general superintendent of production of the Weidely Motors Co. and previous to that was production superintendent and driver for the Glidden tours, hill climbs and economy tests of the Premier Motor Co.

Julian S. Friede, for the last 2 years in the engineering department of the Paige-Detroit Motor Car Co., has enlisted in the Canadian Royal Flying Corps. He will leave shortly for Toronto.

## Men of the Industry

*Changes in Personnel and  
Position*

L. S. James has been appointed sales manager of the Harward Mfg. Co., St. Louis.

Robert M. Barker, formerly advertising manager of the Chase Motor Truck Co., has been appointed director of advertising for the Sanford Motor Truck Co., Syracuse, N. Y.

Myron O. Lawson will resign as assistant advertising manager of the J. I. Case T. M. Co., Racine, about June 15, and will enter government service. He will probably enlist either in the United States Navy or the Marines.

F. W. Simcoe, general manager of the Essex Storage Battery & Supply Co., Newark, N. J., will be manager of the Philadelphia headquarters of the Motor Parts Co. after June 15.

John H. Nelson has been appointed head of the research and metallurgical department of the Wyman Gordon Co., Worcester, Mass. He has been doing research work in steel with the Bureau of Standards at Washington.

## Stairs Heads Harroun Ordnance Production

J. A. Stairs has been appointed general superintendent of ordnance production at the Harroun Motors Corp., Wayne, Mich. He was formerly vice-president of the Eastern Steel Co., New Glasgow, N. S., and during the last 3 years has been specializing in ordnance production.

Walter J. Moore, for the past 2 years office manager of the St. Louis branch of the United States Tire Co., has been transferred to Washington to look after the company's business with the Government.

George H. Hunt, former manager of the Detroit office of the Stromberg Motor Devices Co., Chicago, has resigned, and has been appointed Detroit representative of the Edward G. Budd Mfg. Co., Philadelphia.

Robert M. Gregory has been placed at the head of the purchasing department of the Lane Motor Truck Co., Kalamazoo, Mich. He has been associated with the Chalmers Motor Co., General Motors Corp., Hupp Motor Car Corp., and the Packard company.

H. G. MacEachen, Pacific Coast advertising representative of the Firestone Tire & Rubber Co., Akron, has resigned to join the United States Army.

J. G. McHugh has been appointed a special factory representative for the Federal Motor Truck Co., Detroit.

## Automotive Securities Quotations on the New York and Detroit Exchanges

	Bid	Asked	Net Ch'ge
*Ajax Rubber Co.	57	60	..
*J. I. Case T. M. Co., pfd.	..	88	+3
Chalmers Motor Co., com.	5	6	+ 1/2
Chalmers Motor Co., pfd.	30	40	..
*Chandler Motor Co.	84	86	+3
Chevrolet Motor Co.	124	128	-2
*Fisher Body Corp., com.	30	35	..
*Fisher Body Corp., pfd.	82	87	..
Fisk Rubber Co., com.	54	57	+2
Fisk Rubber Co., 1st pfd.	98	102	..
Fisk Rubber Co., 2nd pfd.	93	96	+1
Firestone Tire & Rubber Co., com.	89	91	-1
Firestone Tire & Rubber Co., pfd.	92	95	..
*General Motors Co., com.	124	126	+7
*General Motors Co., pfd.	81	83	+1
*B. F. Goodrich Co., com.	43	44	..
*B. F. Goodrich Co., pfd.	99	100	..
Goodyear Tire & Rubber Co., com.	143	147	+2
Goodyear Tire & Rubber Co., pfd.	95	97	..
Grant Motor Car Corp.	3	3 1/2	+ 1/4
Hupp Motor Car Corp., com.	2 3/4	3 1/4	..
Hupp Motor Car Corp., pfd.	81	85	..
International Motor Co., com.	30	35	+5
International Motor Co., 1st pfd.	55	65	+7
International Motor Co., 2nd pfd.	35	45	+5
*Kelly-Springfield Tire Co., com.	46	48	+2
*Kelly-Springfield Tire Co., 1st pfd.	78	87	..
*Lee Rubber & Tire Corp.	17	18	+1
*Maxwell Motor Co., Inc., com.	26	28	+2
*Maxwell Motor Co., Inc., 1st pfd.	54	55	+1
*Maxwell Motor Co., Inc., 2nd pfd.	19	20	+1
Miller Rubber Co., com.	99	101	-1
Miller Rubber Co., pfd.	93	95	..
Packard Motor Car Co., com.	105	110	-2
Packard Motor Car Co., pfd.	94	98	+2
Paige-Detroit Motor Car Co.	16	17	-1
Peerless Truck & Motor Corp.	13	17	..
Portage Rubber Co., com.	103	106	+1
Reo Motor Car Co.	13	15	..

	Bid	Asked	Net Ch'ge
*Saxon Motor Car Corp.	7	9	..
Standard Motor Construction Co.	11	13	-1
*Stewart-Warner Speed, Corp.	59	60	+5
*Studebaker Corp., com.	44	45	+4
*Studebaker Corp., pfd.	85	90	-5
Swinehart Tire & Rubber Co.	38	42	..
United Motors Corp.	27	28	+1
*U. S. Rubber Co., com.	56	57	- 1/2
*U. S. Rubber Co., pfd.	102	104	+1
*White Motor Co.	41	42	..
*Willys-Overland Co., com.	19	20	+1
*Willys-Overland Co., pfd.	81	83	+1

\*At close June 8. Listed N. Y. Stock Exchange.

## OFFICIAL QUOTATIONS OF THE DETROIT STOCK EXCHANGE ACTIVE STOCKS

	Bid	Asked	Net Ch'ge
Auto Body Co.	..	7 3/4	..
Bower Roller Bearing Co.	17	18	1 3/4
Chevrolet Motor Co.	125	127	..
Commerce Motor Car Co.	10 3/4	11 1/4	..
Continental Motor Car Co., com.	5 3/8	5 1/2	..
Continental Motor Co., pfd.	92 3/4	..	..
Edmunds & Jones, com.	14	17	..
Edmunds & Jones, pfd.	80	90	..
Ford Motor Co. of Canada	179	188	..
Hall Lamp Co.	..	..	..
Michigan Stamping Co., com.	12 3/4	..	..
Motor Products	..	..	..
Packard Motor Car Co., com.	108	111	..
Packard Motor Car Co., pfd.	93	..	+1
Paige-Detroit Motor Car Co.	..	17	..
Prudden Wheel Co.	12	..	+ 1/4
Reo Motor Car Co.	13 3/4	14	+ 1/4

## INACTIVE STOCKS

Atlas Drop Forge	90	26	..
Kelsey Wheel Co.	..	92	..

# Industrial Review of the Week

A Summary of Major Developments in Other Fields

## Replegle to Have Charge of Distribution of Steel

In an order dated June 6, that no one in the steel trade fully understands, the War Industries Board has put in the hands of J. L. Replegle, Director of Steel Supply, the distribution of the entire iron and steel output of the country. Starting with the sweeping provision that no pig iron or steel products shall be shipped except under priority certificates, the order provides that after all priority requisitions have been filled producers may supply their customers if the latter are on a preferred list, which, as revised, is to be sent out later.

As yet no direct notification of the new order has come to producers, nor has the operation of Government priorities as carried on for many weeks been changed. Requests for interpretations have poured in upon Washington, but thus far no official answer has been given to the urgent requests of various industries to know whether they will have much, or little or no steel from this time forth.

The fact is that to-day no accurate estimate exists or can be made of the Government's steel requirements. Only this week various departments have sent to the Director of Steel Supply additions of not less than 3,000,000 tons to the estimates previously submitted and the programs of the Shipping Board and the Ordnance Bureau are still expanding.

It is believed that various users of pig iron and of finished steel who have had full or partial supplies up to this time will get none in the remainder of the year, but no information can be had as to their identity, for no man in Washington has such information.

One official estimate is that the Government will take at least 85 per cent of the output for strictly war purposes, so that after all allocations are made to the second or preferred list no surplus would be expected for distribution under the "approval in writing of the Director of Steel Supply." Yet there is official sanction for the view that "there may be from time to time considerable quantities of iron and steel for general consumption."

Pending real light on the new order, many producers are going on as heretofore. Much pig iron has been going to foundries not engaged on war essentials. Some furnace companies have already notified such customers that further shipments cannot now be made.

Steel ingot production in May, unlike that of pig iron, shows a slight falling off from the April rate. In 27 working days, May 30 not being a steel works holiday, the output of companies which made 88 per cent of the country's total in 1916 was 3,256,965 gross tons, or 120,628 tons a day, against 3,163,410 tons in April, or 121,670 tons a day. The May

rate, estimating companies not reporting, would mean about 42,300,000 tons a year.

The jobbers of iron, steel and hardware have been called by the Priorities Board to meet with it in Washington June 13 to consider how the Government may help in applying warehouse stocks to essential uses. This recognition of the distributor is noteworthy in view of intimations some months ago that he might be eliminated.—*Iron Age*.

## Recommend Standardized Packing

TOLEDO, June 12—At the first quarterly meeting of the Ohio Automobile Jobbers' Assn. here it was recommended that packages be made a standard size whenever possible, and that the packing be uniform.

## Detroit Optimistic Over Steel

(Continued from page 1144)

is due to the fact that the government is encouraging the manufacture of trucks rather than endeavoring to curtail it. The call for trucks is coming from all quarters; nearly every manufacturer has orders for 10 trucks for every one he can supply. Approximately 50 per cent of the trucks shipped are being used for war work directly or indirectly. This percentage is made up as follows: For ship yards, for use in transporting supplies to them, for use on the farms, and for express lines in inter-city transportation.

The labor shortage still remains a source of worry, although an easing up of the situation was felt immediately after General Crowder's "work or fight" order was issued. The industries are still clamoring for men of the metal trades; even common laborers are sought. If all the munitions required were contracted for, it would be a comparatively easy task to adjust the labor situation; as it is, what the future holds forth in regard to labor is a matter which cannot be predicted at this time.

The coal controversy between the state fuel administrator, W. K. Prudden, and his Wayne County representative, Edgar Whitcomb, remains intense. Prudden desires the resignation of Whitcomb, who refuses to be ousted, and the leaders of the industries of Wayne County do not welcome the thought of having Prudden occupy the position of state fuel administrator. They say he is not endeavoring to secure sufficient coal for this territory and the shortage of coal, should Prudden remain as administrator, would be more keenly felt this winter than last. A petition has been sent to Governor Sleeper asking the resignation of Prudden. For the coming season the state of Michigan has been allotted only 75 per cent of its requirements of anthracite coal.

## Coal Committee Announces 1918 Allotment Program

An interesting feature of the week was the announcement by the Federal Anthracite Committee on Distribution of the long-awaited allotment program. It is estimated by the committee that anthracite production during the present coal year, which will end on March 31, 1919, will total 89,000,000 long tons. Of this amount it is expected that 54,345,783 long tons will be available for domestic consumption, which is 5 per cent more than was distributed for domestic purposes during the last coal year. The remaining 34,654,217 gross tons represent the quantity consumed at the mines, by industries and by the railroads. New England is to receive 10,331,000 gross tons of anthracite, which is 1,497,621 gross tons more than was used in that section last year. Canada, on the other hand, will receive only 3,602,000 gross tons of hard coal this year, as against 3,856,021 tons last year. Reductions will also be made in the quantity shipped to the Middle West and the Northwest. No anthracite coal will be sent west of the Mississippi or south of the Potomac and Ohio Rivers.

Of course, it is one thing to make allotments and quite a different matter to produce the coal. The anthracite industry has lost 32,000 men since the United States entered the war—by draft, by enlistment, and by enticing wages in other industries—and now finds itself in a serious situation. Settle the labor question for the hard coal operators and the problem of a sufficient supply of anthracite to meet all demands would be simplified.

During the week ending May 25 the production of bituminous coal reached a new high level with a total output of 11,811,000 short tons, approximately 100,000 tons more than was produced in the preceding week. Anthracite coal shipments for the week ending May 25 amounted to 40,752 cars, a slight falling off as compared with forwardings during the week ending May 18. Telegraphic advices regarding production for the week ending June 1 indicate that there will be a sharp decline in output for that week, largely owing to the observance of Memorial Day as a holiday.

The matter of fuel priorities is being decided rapidly. No attempt is being made to disguise the fact that many non-preferred industries will fail to get coal this winter.—*Coal Age*.

## 20,000 Goodyear Tires a Day

AKRON, OHIO, June 11—The Goodyear Tire & Rubber Co., now turning out 20,000 tires a day, is more than two and a half months behind in its tire orders. Total sales for the 6 months ended May 1, the first half of the fiscal year, exceeded \$66,000,000, showing an increase



of 40 per cent over the corresponding period of last year. A year ago the company had 300 women in its Akron plants; it now employs 3000 women there and that number will be increased to 5000.

#### Franklin and National Price Increases

NEW YORK, June 11—The following changes in price have been made during the past week:

	New Price	Old Price
<b>Franklin</b>		
2-Pass. ....	\$2400	\$2200
4-Pass. ....	2450	2445
Sedan. ....	3350	3050
Limousine. ....	3400	3200
<b>National, 6-cylinder.</b>		
2-Pass. ....	\$2450	\$2150
5-Pass. ....	2450	2150
7-Pass. ....	2450	2150
Coupe. ....	2945	2645
Sedan. ....	3120	2820
<b>National, 12-cylinder.</b>		
2-Pass. ....	\$3050	\$2750
4-Pass. ....	3050	2750
7-Pass. ....	3050	2750
Coupe. ....	3545	3245
Sedan. ....	3720	3420

#### La Crosse Brings Out New Tractor

LA CROSSE, WIS., June 10—An entirely new model of the Happy Farmer tractor is announced by the La Crosse Tractor Co. The new model will be designated model F and will supersede and displace all previous models in order that the company may devote its entire capacity to its production.

The new machine is built upon the same general lines as model B and its engine has cylinders with a bore of 6 in. and a stroke of 7 in. The engine is rated at 12-24 hp., and the tractor is said to have a drawbar pull of 2000 lb.

The air cleaner is held against the center of the radiator, which is mounted lengthwise on the tubular main frame member. The cleaner is located directly opposite the hub of the fan, which tends to throw dust and dirt away from the center as it revolves.

The tractor is of the three-wheel type, with the engine and transmission gears located close to the rear axle. The price of the tractor is \$1,075, f.o.b. factory.

#### Problems of Female Labor

(Continued from page 1120)

of the regular foremen. In the light of the experience of some of the larger employers of women in munition work in this country, however, it would seem that the advantages of special schools are very great, and that certain results can be obtained through them which cannot be had by the ordinary shop training methods.

As to the ability of women to learn quickly, it can be said that there was no one who objected to the statement that, taken as an average, they learn as quickly as do men, and in many cases much quicker.

The absolute necessity and the obligation which rests upon every manufacturer at the present time to make a personal and most thorough investigation regarding employing women to the greatest possible extent were driven home by

## March Oil Production Reaches High Mark

### Daily Average of Gasoline Was 8,697,676 Gallons—Increase of 50 Per Cent Over March, 1917—Stocks on Hand Much Larger

#### Production of Crude and Distillates

	March, 1918		March, 1917	
	Total	Daily Average	Total	Daily Average
Crude run (bbl.).....	26,239,662	846,441	24,460,800	815,360
Oils purchased and re-run (bbl.) .....	3,696,872	119,254		
Gasoline (gal.) .....	269,627,968	8,697,676	203,677,089	6,755,908
Kerosene (gal.) .....	151,228,007	4,878,323	141,123,626	4,704,100
Gas and fuel .....	587,985,804	18,967,284	467,348,504	15,573,283
Lubricating (gal.) .....	69,308,351	2,235,753	60,848,934	2,078,583
Wax (lb.) .....	43,957,019	1,417,968	35,105,016	1,170,167
Coke (ton) .....	44,248	1,427	41,968	1,398
Asphalt (ton) .....	56,901	1,836	51,265	1,708
Miscellaneous (gal.) .....	94,865,148	3,060,166	21,217,958	707,268
Loss (bbl.) .....	1,097,489	35,403	794,009	26,466

WASHINGTON, June 13—During 1917 the United States produced 342,000,000 bbl. of petroleum, equal to 68 per cent of the total world production. This is 3 per cent higher than the percentage for 1916, the largest percentage since 1875 and the largest total production in the history of the country.

Russia comes second in petroleum with a total of 65,000,000 bbl., which is only 18 per cent of the amount produced by the United States. Mexico is third with 55,293,000 bbl. Other countries produce so small an amount in comparison that they are practically negligible.

Production of oil during March reached a high mark. Crude oil was produced at the rate of 846,441 bbl. a day, as compared with a daily average of 815,330 bbl. in March, 1917. The total of gasoline was 269,627,968 gallons, or a daily average of 8,697,676 gallons. This is 50 per cent greater than the daily average for March, 1917. Production of kerosene also increased, but not in as large a ratio as gasoline.

Stocks on hand at the refineries on March 31 were far greater than the amount on Dec. 31. At the end of 1917 there were 412,256,833 gallons of gasoline

stored away, and on March 31 this was increased to 526,382,386. Crude oil on March 31 was 13,122,241, as compared with 11,638,433 gallons stored away on Dec. 31.

#### Stocks on Hand at Refineries March, 31, 1918

Crude run (bbl.).....	13,122,241
Oils purchased and re-run (bbl.)..	922,360
Gasoline (gal.) .....	526,382,386
Kerosene (gal.) .....	356,580,540
Gas and fuel (gal.).....	483,447,727
Lubricating (gal.) .....	146,572,398
Wax (lb.) .....	162,221,741
Coke (ton) .....	11,301
Asphalt (ton) .....	107,122
Miscellaneous (gal.) .....	238,659,787

#### World Production of Petroleum in 1916 and 1917 by Countries

Countries	1916 Barrels	1917 Barrels
United States .....	*300,767,000	*342,000,000
Russia .....	72,801,000	65,000,000
Mexico .....	39,817,000	55,293,000
Dutch E. Indies.....	13,174,000	14,000,000
Roumania .....	10,298,000	6,060,000
India .....	8,229,000	8,500,000
Gallia .....	6,462,000	5,500,000
Japan and Formosa...	2,997,000	2,800,000
Peru .....	2,551,000	2,500,000
Trinidad .....	1,000,000	1,655,000
Germany .....	996,000	900,000
Argentina .....	870,000	800,000
Egypt .....	411,000	500,000
Estimated total .....	460,639,000	503,708,000

\*Marketed production.

one speaker put it, will leave the care of their babies and households to their mothers and grandmothers while they go out into the business world and do their husbands' and brothers' work.

Welfare work among women will have to be given special attention by employers, and, when taken up systematically, will be found to yield a most substantial return.

One plant, at least, which was represented at the meeting, has already gone far beyond the average in this direction, and has, among its other interesting ventures and activities, established a day nursery in connection with the plant in which the babies of a considerable number of mothers who are employed by the company are cared for while the mothers work. At least during the period of the war, it would seem that the manufacturers of the country will feel themselves called upon to do a good deal of this kind of work.

## Standard Motor Parts Buys Abbott Equipment

CLEVELAND, June 8—The name and good-will of the defunct Abbott company, as well as the service department, jigs, dies, tools, etc., have been purchased by the Standard Motor Parts Co. The business will be conducted here under the style Abbott Motor Car Co.

### Part of Government Order for Continental

DETROIT, June 8—Of the order for 8000 class B motors placed by the Government, the Continental Motor Co. has received a large part. Deliveries will begin from that plant by July 1.

### Buda Erecting Addition

HARVEY, ILL., June 9—The Buda Co. has added a 4-story building to its plant, and has rearranged the interior of its other buildings so as to be able to add equipment. Despite the increased capacity of the plant, the Buda Co. has licensed the United States Government to have the engines manufactured by other companies.

### Kansas City Tire Offices Moved

KANSAS CITY, June 9—The general offices of the Kansas City Tire & Rubber Corp. have been moved to new quarters in the Commerce Building.

### Chicago Mitchell Distributer Adds Selden

CHICAGO, June 9—The Mitchell Automobile Co., Mitchell distributor, has added the Selden truck, and the style of the company has been changed to the Mitchell-Selden Sales Co. Mitchell cars and Selden trucks will be distributed in Illinois, Indiana, Wisconsin and southwestern Wisconsin by the organization.

### Goodyear Gives \$550,000 for War

AKRON, June 8—The Goodyear Tire & Rubber Co. announces a total subscription of \$550,000, contributed by more than 18,000 employees, during the campaigns of the various war activities. This contribution constitutes almost 25 per cent of the entire amount obtained in the Akron campaign. Approximately 4000 Goodyear workmen have already gone to training camps and to France.

### New York Office for Grossman

BROOKLYN, June 9—The Emil Grossman Mfg. Co. has opened an office in the Buick Building, 1733 Broadway, New York, for export and domestic business. Sidney S. Frank has been appointed manager.

### Accidents in Ford Plants Reduced

DETROIT, June 8—The Ford Motor Co. has reduced its lost-time accidents 74.2 per cent in the last 18 months. During the 26 working days in April there

## Current News of Factories

*Notes of New Plants—Old  
Ones Enlarged*

were only 46 lost-time accidents, making the average number of accidents per 1000 employees 1.4. The number of minutes lost, if distributed over the entire working force, would equal 7.5 min. per employee for the month. Eleven months elapsed at the plant without a fatal accident. There was one death from accident in April.

### Work Started on New Hackett Factory

BURLINGAME, MICH., June 8—Work on the new factory of the Hackett Motor Car Co., comprising 4 units, is under way. Three of the units will be built parallel, and will be linked together at the end by the fourth, which will contain executive offices, stockrooms, experimental departments, etc. The total floor space of the entire four units will be 180,000 sq. ft., and will give a daily capacity of 100 cars.

### Lewis-Hall Erecting Addition

DETROIT, June 8—The Lewis-Hall Iron Works, manufacturers of the Hall truck, are erecting a 1-story frame building to be used for assembling. The company has just completed an order for 6 government trucks. The output is 45 trucks a month.

### Central Foundry Co. Formed

SAGINAW, MICH., June 8—The Central Foundry Co. has been incorporated with a capitalization of \$10,000 by T. S. Merrill, secretary of the General Motors Corp.; H. H. Rice and H. L. Barton. Announcement of the factory site has not been made, but it is stated that the preliminary work of organization will be started immediately.

### To Get War Contracts for Saginaw

SAGINAW, MICH., June 8—The Saginaw Manufacturers' War Service Co. has been organized with a capitalization of \$25,000 to obtain contracts for war material from the United States and Allied governments. The incorporators are: Harry T. Wickes, W. J. Wickes, Fred L. Helfrecht, Walter M. Germain, Hiram A. Savage, W. D. Janes, A. M. Lempke, John Herzog, S. L. Eastman, A. B. Albright, Fred W. Storch, P. J. Drummond, W. M. Guider, John Stenglein, C. V. Hale, A. C. L. Miessler, A. B. Lewless, Harker W. Jackson and John L. Jackson.

### Scripps-Booth Leases Abbott Plant

DETROIT, June 9—The Scripps-Booth Corp. has leased the former plant of the Abbott Motor Corp. on East Lafayette Boulevard, and will use it for storage and service purposes.

## United Motors to Make a New Series of Trucks

GRAND RAPIDS, June 8—The United Motors Co. will start production next month on a new series of trucks, including 1½, 2½, 3½ and 5-ton capacities. The models will be ready for shipment in 60 days, according to the company, and it is estimated that an output of 50 trucks a month will be maintained. The prices have not been determined yet.

### Wolverine Planning New Model

SAGINAW, MICH., June 8—The Wolverine Tractor Co. is planning to manufacture a 4-wheel drive machine with a creeper-type attachment. Production is expected to begin about September.

### Peninsular Buys Factory Site

DETROIT, June 9—The Peninsular Milled Screw Co. has acquired 10 acres of land on Mt. Elliott Avenue, on which it intends to erect a factory building next year.

### Peerless Buying Back Gold Notes

CLEVELAND, June 9—The Peerless Truck & Motor Corp. has advertised that it will buy back \$500,000 worth of its 10-year secured, 6 per cent, convertible gold notes.

### Palmer Plant Leased

DETROIT, June 9—The Everitt Brothers Co., body painter and finisher, has leased the plant formerly used by the Palmer Mfg. Co. This contains about 40,000 sq. ft. of floor space.

### More Navy Contracts Awarded

WASHINGTON, June 8—The Bureau of Supplies and Accounts of the Navy has awarded contracts as follows:

Empire Rubber & Tire Co., Trenton, N. J.; rubber hose.  
Champion Spark Plug Co., Toledo, Ohio; spark plugs.  
Champion Ignition Co., Flint, Mich.; spark plugs.  
Hall-Scott Motor Co., San Francisco, Cal.; propellers.  
Holt Tractor Co., Peoria, Ill.; tractors.  
Cleveland Tractor Co., Cleveland, Ohio; tractors.  
United States Rubber Co., New York City; rubber hose.  
Acme Rubber Mfg. Co., Trenton, N. J.; rubber tubing.

### Chalmers Repair Parts Price Increase

DETROIT, June 8—The Chalmers Motor Co. has increased the price of all Chalmers repair parts 30 per cent, effective June 1.

### Rainier Chassis Advanced \$125

NEW YORK, June 9—The price of the Rainier Model R-4 1¼-ton chassis has been advanced from \$1,350 to \$1,475.



## May Tax Tungsten Exports

### Conserving of Supply Causes Committee to Ask for Levying of Duty

LONDON, ENGLAND, May 6—In order to conserve the necessary supply of tungsten for the British industry, it has been recommended that an export tax of \$125 per ton be paid on wolfram ore, from which tungsten is made. This recommendation has been made by the Committee on Commercial and Industrial Policy After-the-War, which has for its work the making of necessary surveys with regard to what is known as key industries, by key industries being meant those that are essential in other industries. Thus the tungsten industry is essential to all using this material.

The availability of adequate supplies of tungsten is absolutely essential to the whole engineering industry. Wolfram ore is produced in considerable quantities within the British Empire, especially in Burma and Australia, and there are some deposits in Cornwall, though they have not yet been commercially worked. During the war large supplies have been obtained from the United States, but it is felt that the British Empire should be self-supporting in this respect. Before the war only a negligible quantity of tungsten was made in Great Britain, and almost complete reliance was placed upon supplies obtained from Germany. Now a number of reduction works have been started in England to retain sufficient supplies of ore within the Empire.

If a market cannot be found within the Empire the ore shall be offered to the government at the current price, and if the government does not decide within 14 days to buy, a certificate shall be issued allowing the whole to be sold to any buyer, without payment of the export duty. Thus, in fact, this export duty may be regarded rather as a penalty for the evasion of the procedure that is considered desirable than as an actual duty which would, in fact, have to be paid as a general thing.

Having thus secured the supply of ore, the question arises as to whether the reduction works need any artificial assistance. The conclusion is that their position is a strong one, but that if necessary they may be granted subsidies or special consideration as regards war taxation, having regard to the exceptional cost incurred in the installation of works and the conduct of research during the war. It is definitely recommended that a grant should be made to meet this excessive expenditure, but there are no proposals as regards tariffs or any obligation of the government to buy only from British suppliers.

#### Mexico Importing Tractors

LAREDO, TEX., June 8—During April and May, 1918, the value of tractors and other farm machinery sent to Mexico

via Laredo, Brownsville and El Paso was \$300,000. It is estimated that the tractors exported comprised one-half of this amount. The Mexican Department of Agriculture is advocating the use of farm machinery and has established schools in which the use of tractors is taught. On several sugar plantations on the west coast all of last season's plowing was done by tractors, and the cane hauled to the mills in motor trucks. Tractors are also being used extensively in the Laguna and Tampico regions.

#### Taylor Succeeds McDuffee

CHICAGO, June 9—William B. Taylor succeeds Joseph H. McDuffee as president of the Overland Motor Co. of Chicago. There will be no change in the policy of the company nor in territorial jurisdiction; the facilities of the Chicago concern, however, will be utilized to a greater extent than in the past for transferring and reshipping for other Overland branches. Mr. Taylor is now in the motor car business, but for the last 30 years has been prominent in the farm implement field. He comes here from Kansas City, where for a number of years he has been manager of the Kansas-Moline Plow Co.

#### To Investigate New Gasoline Process

WASHINGTON, June 7—A resolution introduced in the House of Representatives yesterday calls for an investigation by the Committee on Standards, Weights and Measures of a new process of extracting gasoline and other motor fuel from petroleum and fuel oil. The process is the discovery of S. N. Herber, St. Joseph, Mo., who says that he can extract the gasoline in greatly increased quantities and at much less than the present cost.

#### Detroit Return Load Bureau Slow in Starting

DETROIT, June 8—The Return Loads Bureau is experiencing some difficulty in getting started. The response from truckmen has not been as good as was expected, and so far only a few have said that they were willing to co-operate with the movement. John McNally, head of the Detroit Return Loads Bureau, said recently that the reason why the bureau was not meeting with greater favor was that there were comparatively few cities near Detroit which were doing a large inter-city transportation business.

#### Northway Plant Placed Under Oakland

PONTIAC, MICH., June 8—The local unit of the Northway Motor & Mfg. Co., which hitherto has been controlled and handled by the Detroit offices, has been placed under direct charge, and will operate as a unit of the Oakland Motor Car Co., Pontiac. The change has been made to bring about greater concentration and also to relieve the Detroit offices of a large amount of work entailed under the former system of control of the Northway plant. The Northway plant employs 1000 men and women. The schedule output is now 300 engines daily.

## Use Browning Guns for Aircraft

### Successful Tests Completed—Select Heavy Type with Jackets Removed

WASHINGTON, May 28—The Browning machine gun has undergone tests made to determine its value for use on airplanes, according to the War Department. The gun functioned perfectly, reports state, and as a result of the tests, the heavy type gun with the outer jacket removed will be used for aircraft.

The official announcement says:

This is one of three types of machine guns with which the rate of fire can be so synchronized with the revolutions of the propeller of a tractor airplane that the gun can be fired by the pilot of a combat plane through the revolving blades. Firing in that fashion, it is necessary to aim the machine gun by steering the plane directly at the target. The direction of the plane gives direction to the fire and the pilot can fire the machine gun while controlling the plane.

Airplane propellers revolve at from 600 to 2000 revolutions per minute. The machine gun is connected with the airplane engine by a mechanical or hydraulic device, and impulses from the crankshaft are transmitted to the machine gun. The rate of fire of the machine gun is constant and its fire is synchronized with the revolving propeller blades by "wasting" a certain percentage of the impulses it receives from the airplane engine and by having the remaining impulses trip or pull the trigger so that the gun fires just at the fraction of the second when the propeller blades are clear of the line of fire.

The pilot operates the gun by means of a lever which controls the circuit and allows the impulses to trip the trigger.

The test given the Browning gun was severe. A gun was mounted on the frame of an American combat plane and connected with the airplane engine. The test was conducted on the ground and in place of the propeller a metal disc was attached to the crankshaft. The Browning gun was then required to register hits on the metal disc as it revolved at varying speeds from 400 to 2000 revolutions per minute. The slightest "hang fire" or delay in action on the part of the gun would have been shown by the failure of the bullets to hit precisely on the spot on the disc representing the center of the zone of fire. The gun functioned perfectly.

The Browning gun to be used with aircraft is the heavy type with the water jacket removed.

Besides the Browning, the United States will also employ the Marlin aircraft gun as a synchronized weapon. Several thousand of these have been manufactured and the gun is in quantity production.

The British and French use the Vickers as a synchronized machine gun.

The Lewis aircraft machine gun is used by the British, French and American forces, but for a different purpose. In a two-seater combat plane, fixed machine guns are mounted forward to be operated by the pilot and flexible guns are mounted to be operated by the observer in the rear seat of the plane. The observer operates Lewis guns on flexible mounts, firing to right or left of the plane.

It is of vital importance to have absolute reliability of function in a synchronized machine gun on tractor airplanes. Delays in

fire or malfunctions due to faulty construction or imperfect ammunition causes bullets to strike the propeller blades. As many as fifteen bullets have been known to strike a propeller blade without causing an airplane to fall, but the danger of such occurrences is nevertheless obvious. For that reason, every effort is made to provide the most perfect type of weapon for this work. Only specially selected ammunition is used.

#### Seventeenth Used Car Report Out

CHICAGO, June 8—The seventeenth edition of the National Used Car Market Report has been issued by the Chicago Automobile Trade Assn. Cars that have been added are the Commonwealth, Harroun, Moore and States. Cars that have been dropped are Benz, Meteor, Michigan, Palmer-Singer, Rayfield, Selden, Woods Dual Power and Columbus electric.

#### Airplane Mail Satisfies Burleson

WASHINGTON, June 8—Postmaster General Burleson has said that he is fully satisfied with the air mail service and is arranging future plans for its extension. Of the 12 trips made during the 2 weeks 8 were completed before 3 p. m. and 2 before 2:50 p. m. One trip was completed at 2:25 and two at 2:34. There were two delays, causing the mail to reach New York at 4:45 p. m. The airplane mail service from New York arrived in Washington 6 times before 3:30 p. m., twice between 3:30 and 4 p. m. and 4 times after 4 o'clock.

#### Mail Planes Observe Wind Conditions

WASHINGTON, June 8—The Post Office Department, through its airplane mail service to New York, is making meteorological observations. One plane in "ballast" attained an altitude of 15,300 feet over Laurel, Md., which showed lessened wind pressure as compared with lower altitudes. The engine power showed a reduction, but not as great as the wind decrease. The temperature at that elevation was 30 per cent lower than on ground level.

#### New Anti-Glare Law for New York

NEW YORK, June 8—Secretary of State Hugo, in charge of the Automobile License Bureau of New York, is working on a new anti-glare headlight law, and expects to announce within a month what headlight devices will be permitted throughout the state, and what ones will not.

## Overland War Profits \$7,000,000

Within 20 Per Cent of the 1917  
Manufacturing Earnings—  
Plenty for Dividends

TOLEDO, June 8—War profits of the Willys-Overland Co. will be between \$7,000,000 and \$8,000,000 this year, according to a statement made by John N. Willys at the annual meeting of the company last week. He said that this is within 20 per cent of the 1917 manufacturing profits, and that, in all probability, the company will earn its entire preferred and common dividends for the year in the second quarter alone.

Separate departments and organizations have been established for the new business, according to Mr. Willys, so that no factory or financial readjustments would be necessary this year. In May the company produced and shipped 1004 airplane engines and a similar number will be made in June. Deliveries on the Government contract for 3000 gun carriages will begin soon. The company also has a \$10,000,000 contract for 8-in. machining shells.

#### Educate Colored Mechanics

WASHINGTON, June 8—Accommodations for the training of 4000 negroes in radio engineering, automobile mechanics, operation of motor vehicles, etc., have been completed at the Howard University, Tuskegee Institute, Hampton Institute, Negro Agriculture and Technical College, Prairie View Normal and Industrial College, Colored Agricultural and Normal School, Branch Normal School, Atlanta University and the Western University. The students will be selected from the ranks of colored draftees and will be assigned to regiments of colored troops after their graduation.

#### Michigan Needs Gas Engine Instructors

ANN ARBOR, MICH., June 8—Unless the University of Michigan obtains more instructors before June 15, it will not have adequate facilities for teaching the 700 students who will be sent there by the War Department at that time to be trained in automobile mechanics. The university is calling for 35 gas engine

men who are fitted to instruct students in automobile adjustment and repair work.

The instruction to be given is in chassis and engine repair and carbureter, starting, lighting and ignition adjustment and repair. Two kinds of men are desired—experts and men who have only a limited amount of knowledge about automobile building and repair as a whole, but who know well some one thing about an automobile.

#### Half of Parcel Post Money for Roads

WASHINGTON, June 10—Authority for the expenditure by the Postmaster-General of not more than 50 per cent of the gross earnings of the motor truck parcel post routes for the construction and maintenance of highways on which the service is maintained will be proposed to-morrow in a resolution to be introduced in the House of Representatives. Congressman Aswell of Louisiana is bringing up this resolution.

#### St. Louis Ford Plant Taken Over

ST. LOUIS, June 10—The Ford assembling plant here will be taken over by the Government within 30 days as a food warehouse. All Ford work will be stopped at that time and the 300 men employed have been offered positions in the food depot by the Government.

#### Special Airplane Course Ended

WASHINGTON, June 10—Several commissioned officers of the American air service have completed the first special courses in compass adjustment and air navigation. The Department of Military Aeronautics recently organized the school at Camp Dick, Dallas, Tex., for this instruction. The two courses were conducted at the same time and completed in two weeks, under direction of British officers.

The compass course was designed to give engineer officers special instructions in adjustment and compensation of airplane compasses which frequently get out of order because of local magnetic fields set up by the magnetos and engines, and from jars due to rough landings. The course in navigation consists of instruction in flying by dead reckoning, which is followed when the ground is not in view. The officers who were graduated from these courses are returning to their respective flying fields to instruct cadets in these subjects.

## Calendar

#### RACING

June 22—Chicago. Chicago Speedway.  
July 4—Cincinnati. Cincinnati Speedway.  
July 4—Tacoma, Wash. Tacoma Speedway Assn.  
July 27—Chicago. Chicago Speedway.  
Aug. 3—Uniontown. Uniontown Speedway Assn.  
Aug. 10—Providence, R. I.  
Aug. 17—Sheepshead Bay.  
Sept. 2—Uniontown. Uniontown Speedway Assn.

Sept. 7—Chicago. Chicago Speedway.  
Sept. 21—Sheepshead Bay.  
Oct. 5—Cincinnati. Cincinnati Speedway.

#### ASSOCIATIONS

June 17-19—Dayton, O., Society Automotive Engineers, Annual Midsummer Session.  
June 18—New York. Credit Managers Motor & Accessories Manufacturers' Assn.

June 21—New York. Financial and Executive Meeting of the Motor & Accessories Assn.

#### SHOWS

Sept. 23-28—Chicago. National Accessory Show for Fords. Coliseum.  
Oct. 14-27—Dallas, Tex. Seventh Annual Texas Automobile Show. Texas State Fair.

#### ENGINEERING

June 26-28—Buffalo, N. Y. American Society of Heating and Ventilating Engineers.  
Sept. 2—Cripple Creek, Colo. American Institute of Mining Engineers.  
Nov. 14-15—New York. Society of Naval Architects and Marine Engineers. Twenty-sixth general meeting. Engineering Societies Bldg., 29 West 39th Street.